

Norwood, Richard
Norwood's EPITOME:
BEING

The Application of the Doctrine of TRI-
ANGLES, in certain *Problems*, con-
cerning the Use of the Plain *Sea-Chart*,
and *Mercator's Chart*.

Being the two most usual kinds of *Sailing*.

With a Table of Artificial *Sines* and *Trangents*,
and the *Complements Arithmetical* of *Sines*, sup-
plying the Use of *Secants*.

To *Radius* 10,00000 and to every Degree and Mi-
nute of the Quadrant.

ALSO

The *Logarithms* of Absolute Numbers from 1 to 2000;
with a Table of the Right *Ascension* and *Declination* of the
Sun, and certain principal Fixed Stars,

Whereunto is added, the farther Use of the forenamed Tables,
in Questions of *Navigation*, *Astronomy* and *Geography*: As also
an Universal *ALMANACK*.

The last Edition, newly Revised and Corrected.

By Richard Norwood, Reader of the *Mathematicks*.

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Normood's EPITOME:

Being the Application of the Doctrine of Triangles in the two principal Kinds of Sailing.

MY Intent was here to have annexed a Treatise of Navigation, and especially of such Points therein, as have reference to the whole Doctrine of Plain and Spherical Triangles: But I have here shewed the Resolution of all useful Problems, touching the two principal Kinds of Sailing by right-lined Triangles.

Questions of Sailing by the plain or ordinary Sea-Chart.

Although the Ground of the Projection of the ordinary Sea-Chart being false, (as supposing the Earth and Sea to be a plain Superficies) and so the Conclusions thence derived, must also for the most part be erroneous; yet, because it is most easy, and much used, and the Errors in small Distances not so evident, we will not wholly neglect it.

Quest. 1. *Sailing 100 Leagues upon the sixth Rumb, how much shall I alter my Parallel or Latitude?*

Note. The Angle that any Point of the Compass makes with the Meridian, we call the Rumb; but the Angle that it makes with any Parallel, we call the Complement of the Rumb.

And forasmuch as to every Point of the Compass there answers 11 deg. 15 min. therefore the sixth Rumb from the Meridian (namely, E.N.E. E.S.E.W.S.W. or W.N.W.) makes an Angle therewith of 67 deg. 30 min. whose Complement 22 deg. 30 min. is the Angle of the same Rumb with every Parallel.

Problems of Sailing



Now admit I sail from C to A, East North-East, 100 Leagues; I demand the Difference of Latitude B C.

By the third Case of Plain Triangles,

As Radius

To the Distance run, A C 100 Leagues, 2,00000

So Sine Compl. the Rumb, A 22 deg. 30 min. 9,58284

To the Difference of Latitude B C 38 $\frac{1}{2}$ Leagues 1,58284

In like manner you may find the Difference of Latitude for any Distance run upon any other Point of the Compass.

2. Sailing 100 Leagues upon the sixth Rumb, How far am I departed from the Meridian of the Place from which I came?

That is, by the same things given as before I demand A B.

By the third Case of Plain Triangles,

As Radius

To the Distance run, A C 100 Leagues, 2,00000

So is the Sine of the Rumb, C 67 deg. 30 min. 9,96562

To the Departure from the Merid. A B 92 $\frac{1}{2}$ Leagues 1,96562

3. Sailing upon the sixth Rumb, till I alter my Latitude one Degree; I demand how far I have sailed?

As sailing from C to A, East North-East, till the Difference of Latitude B C be 20 Leagues; I demand the Distance run A C.

Say by the second Case of Plain Triangles.

As Sine Compl. the Rumb A 22 d. 30 m. co. ar. 0,41716

To the Difference of Latitude B C 20 Leagues, 1,30103

So is Radius

To the Distance run A C 52 $\frac{3}{8}$ Leagues, 1,71819

The like Question may be moved by the Departure from the Meridian given.

4. Sailing upon the sixth Rumb, till I have altered my Latitude one Degree; How much am I departed from my first Meridian?

As sailing from C to A, East North-East, till the Difference of Latitude B C be 20 Leagues; I demand A B, my Departure from the Meridian, (as for Example in the former Type.)

By

by the Plain Sea-Chart.
By the first Case of Plain Triangles.

3

As Radius

To the Difference of Latitude, CB 20 Leagues, 1,30103
So is the Tangent of the Rumb, tC 67 deg. 30 min. 10,38278
To the Departure from the Merid. AB 48 $\frac{3}{10}$ Leagues, 1,68381

In like manner by the Departure from the Meridian given, you might find the Difference of Latitude.

5. Sailing upon some Rumb between the North and East $52 \frac{3}{10}$ Leagues, and finding that I have altered my Latitude one degree; I demand upon what Point I have sailed?

As if I sail from C to A, (being some Rumb between the East and North) $52 \frac{3}{10}$ Leagues; and then find the Difference of Latitude CB to be 20 Leagues; I demand the Angle A CB.

Say by the sixth Case,

As the Distance, run CA $52 \frac{3}{10}$ Leagues co. ar. 8,28191
Is to Radius;

So is the Difference of Latitude CB 20 Leagues, 1,30103
To Sine Compl. the Rumb s A 22 deg. 30 min. 9,58294

Whose Complement C, 67 deg. 30 min. is the sixth Point from the Meridian, namely East North-East. Here we neglect some part of a minute, (as in these things not to be regarded) and so in other places.

6. Sailing upon some Rumb between the North and the East, $52 \frac{3}{10}$ Leagues, and finding that I have altered my Latitude one degree, I would know my Departure from my first Meridian.

By the seventh Case.

To the distance run, add the difference of Latitude, and also subtract it from the said distance, noting the Sum and Remainder. Then add together the Logarithms of this Sum and Remainder, and half that Total is the Logarithm of the distance from the first Meridian.

Distance run CA, $52 \frac{3}{10}$ Leag.	Sum $72 \frac{3}{10}$ Leag.	1,85884
Diff. of Latit. CB 20 Leag.	Remaind. $32 \frac{3}{10}$ Leag.	1,50853
		3,36737

Departure from the Meridian AB, $48 \frac{4}{10}$ Leagues, 1,68368

The same may be otherwise found by the same Case:

And in like sort might the difference of Latitude be found, the Departure of the Meridian being known.

7. The

7. *The Distance of the Meridians of two Places, and the Difference of the Latitudes of the same Places being given; to find the Rumb and Distance.*

As, let A represent the *Lizard* in the West Part of *England*, and AB the Parallel thereof, and let C represent *St. Mary's Island*, being one of the *Azores*, CB the Meridian thereof.

Then is AB the Distance of the *Lizard* from the Meridian of *St. Mary's*, which let be 272 Leagues; and AC the Distance of their Parallels, or Difference of their Latitudes, 256 Leagues; I demand the Rumb, namely, the Angle at C, and the Distance in the Rumb AC.



First, for the Rumb, say by the fourth Case,

As the Difference of Latit. CB 256 Leagues, co. ar. 7,59176
Is in proportion to Radius;

So is the Distance of the Meridian AB 272 Leagues, 2,43457

To the Tangent of the Rumb $\angle C$ 46 deg. 44 min. 10,02633
which is the fourth Rumb from the Meridian, and 1 deg. 44 m. more, which shews the Course from *St. Mary's* to the *Lizard* to be North-East, 1 deg. 44 min. Easterly, or from the *Lizard* to *St. Mary's* South-West, 1 deg. 44 min. Westerly. And thus it should be by the plain Chart.

Secondly, for the Distance AC, say by the second Case,

As the Sine of the Rumb $\angle C$ 46 deg. 44 m. co. ar. 0,13716
To the Distance of the Meridian AB, 272 Leagues, 2,43457
So is the Radius

To the Distance of the Places AC, 373 $\frac{1}{2}$ Leagues, 2,5733
And such should be the Distance by the Plain-Chart.

8. Sailing away *W. S. W.*, I see a Point of Land, which I set, and find to bear from me *West by North*; and having sailed 6 Leagues further, I find that it bears from me *North-west by West*; I would know how far it is distant?

As, let E be a Point of Land, which, when the Ship is at A, I set, and find to bear from *West by North*; but I hold on my Course from A to D, *West South-West* 18 Miles; and at D I set the same Point of Land again, and find it to bear from me *North-west by West*;



I demand the Distance thereof *DE*; that is, how far it was from me in my last Observation?

First, I consider between *AE*, the *West by North*, and *AD* the *West-South-West*, is three Points of the Compass; that is, *33 deg. 45 min.* which is the Angle at *A*: also between *EA*, the *East by South*, and *ED*, the *South-East by East*, are two Points; that is, *22 deg. 30 min.*

Therefore, by the 3th Case of Plain Triangles,

As Sine the Ang. at the Point seen, *E 22 d. 30 m. co. ar. 0,4176*
Is to the Distance run, *AD 18 Miles,* *1,25527*

So Sine the Angle at the first place of Observation, *A 33 deg. 45 min.* *9,74474*

To the Distance of the Point seen, *ED 26 $\frac{1}{10}$ Miles,* *1,41717*

Whereby it appears, that the Distance of the Point seen from the place of your last Observation, is 26 Miles and a Furlong; in like manner you may find the Distance thereof from the place of your first Observation *A*.

Admit the Course from the Lizard to *S. Mary's* be *S. W.* the Distance *373 $\frac{1}{2}$ Leagues*.

A certain Ship bound from the Lizard to *S. Mary's*, steers away *S. S. W.*, and afterwards *W. by S.* and so sometimes upon one of these Points, sometimes upon the other, till she arrives at *S. Mary's*; Now I demand how many Leagues she hath sailed upon one of these Points, and how many upon the other?

Problems of Sailing

Let A be *Lizard*, E *St. Mary's* and seeing S.S.W. being from South-West two Points, makes an Angle therewith of 12 d. 30 min. which let be A; also West by South makes with S.W. an Angle of 33 deg. 45 min. which let be E, also South S.W. makes with West by South, an Angle of 56 deg. 15 min. which let be the Complement of D to 180 degrees.

Therefore by the eighth Case,

As the Sine of	D, 56 deg. 15 min. co. ar.	0,08015
To the Distance given A E,	373 $\frac{1}{2}$ Leagues,	2,57113
So is the Sine of	E, 33 deg 45 min.	7,94474

To	A D, 248 $\frac{5}{15}$ Leagues,	2,39602
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Which is the Distance run upon the west by South Points.

Again,

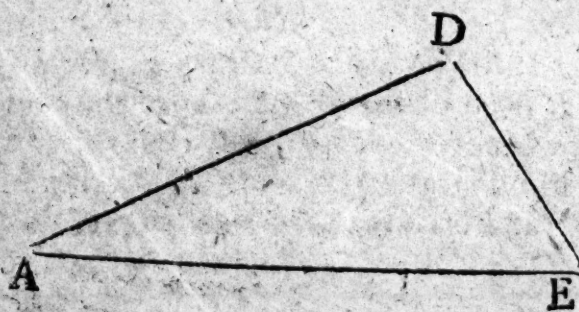
As the Sine of	D, 56 deg. 15 min. co. ar.	0,08015
To the Distance given A E, 372 $\frac{1}{2}$ Leagues,		2,57113
So is the Sine of	A 22 deg. 30 min,	9,58284

To the way run,	E D, 171 $\frac{4}{100}$ Leagues,	2,23412
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Which is the Distance run upon the west by South Points.

10. A Merchant-man, being in the Latitude of 43 degrees, falls into the hands of Pirats, who amongst other things, take away his Sea-Compass. But when he is gotten clear, he sails away as directly as he can, and after two days meets with a Man of War, who also had been the day before in the Latitude of 43 deg. and had sailed thence S. E. by South 37 Leagues. He, desirous to find those Pirats, the Merchant man tells him he left them lying to and from where they took him, and he had sailed since at least 64 Leagues between the South and west; what Course shall the Man of war shape to find these Pirats?

Let A E be the Parallel of 43 Degrees, D the Place where the Ships meet: then is there given A D 64 Leagues, E D 37 Leagues, and the Angle D E A 5 Points, or 56 deg. 15 min.



Therefore

Therefore by the ninth of Plain Triangles,

As the Distance run by
 the Merchant-man } A D, 64 Leagues, co. ar. 8,19382
 To Sine the Angle given, s E, 56 deg. 15 min. 9,91985
 So is the Distance run } E D, 37 Leagues, 1,56820
 by the Man of War
 To Sine an Angle required, s A, 28 deg. 44 min. 9,68187
 That is, West-South-West, 6 deg. 14 min. Southerly, and so
 hath the Merchant sailed; therefore to return to the same
 Place, he must shape his Course East North-East 6 deg. 14 min.
 Northerly.

11. There are 2 Ports lying N. E, and S. W. one off another, a
 Ship sails from the Westermost of these Ports East South-East 47
 Leagues; another departing from the Eastermost Port sails 66
 Leagues, and then meets with the former: What Course hath this
 second Ship kept, and how far are these Ports asunder?

Let the North-East Port be A, the South-West E, and the
 Place where these Ships meet at D. And forasmuch as from E
 to A, the Course is North-East, and from E to D East South-
 East, therefore the Angle at E, is 67 deg. 30 min. and the side
 E D 47 Leagues, and A D 66 Leagues,

Therefore by the 9th Case of Plain Triangles,

And seeing from A to E, the Course is South-West, and from
 A to D 41 deg. 8 min. more Southerly; therefore the Course
 from A to D, is South 3 deg. 52 min. Westerly.

As A D 66 Leagues co. ar.	8,18064
To Sine E, 67 deg. 30 min.	9,96561
So E D 47 Leagues,	1,67210
To Sine A, 41 deg. 8 min.	9,81817

Secondly, for the Distance of these Ports A E, the Angle at
 A, being 41 deg. 8 min. and the Angle at E 67 deg. 30 min.
 the Sum of them both is 108 deg. 38 min. which subtracted
 from 180 deg. leaves the Angle at D, 71 deg. 22 min.

Therefore

Therefore by the 8th Case of Plain Triangles,

As Sine E 67 d. 30 m. co. ar.	0,03439	So that the Di-
To A D 66 Leagues,	1,81954	stance between the
To Sine D 71 deg. 22 min.	9,97662	two Ports is 67 $\frac{7}{10}$
To A E 67 $\frac{7}{10}$ Leagues.	1,83055	Leagues.

Some may think it requisite, that the latter part of this Problem should have been a distinct Case in Plain Triangles; but because the same things are here given, as in the 9th Case, and the Operation manifest by the 8 and 9, I thought it not necessary to make another Case of it.

12. *Coasting along towards the Evening, I have sight of a Cape or Head-land, beyond which I desire to steer in; the next Morning it bears from me S.S.E. and is distant by estimation 11 Leagues; but I steer away South till two of the Clock in the Morning about 12 Leagues; and then would know how the Cape bears from me, and how far it is off?*

As, admit A, I observe the Cape D to bear from me South South-East 11 Leagues; but I steer away South, to E 12 Leagues, I have then A D 11 Leagues, A E 12 Leagues, the Angle at A 22 deg. 30 min. (as for Example) in the foregoing Type.

First then, for the Angle at E by the 10th Case.

As A E ——— A D 23 Leagues com. ar.	8,63828
To A E ——— A D, 1 League	
So $t\frac{1}{2}(E \times D) \pm 78$ degrees 45 minutes,	10,70134
To Tang. an Angle F, 12 degrees 20 minutes,	9,33964
Which subtracted,	
their remains	E 66 deg. 25 min.

In working this Example, because the Angle given A, is 22 deg. 30 min. therefore the other two E and D, are 157 deg. 30 min. (by the first Lemma of the third Chapter of plain Triangles) the half where of is 78 deg. 45 min. Whereby we find an Angle F, 12 deg. 20 min. which subtracted from 78 deg. 45 min. there remains the Angle at E. 66 deg. 25 min. Wherefore seeing E A is a North-line, E D is almost East North-East, namely, East-North-East 1 deg. 5 min. Northerly.

Secondly,

Secondly, for the Distance of the Cape E D by the 8th Case.

As Sine the Angle found, $t E 66^{\circ} d. 25 m.$ co. ar.	0,03788
To the Distance in the Evening, A D 11 Leagues,	1,04139
So the Sine of the Angle given, $s A 22^{\circ} d. 30 m.$	<u>2,58284</u>
To the Distance in the Morning, E D 47° Leagues,	0,66211
That is above 4 Leagues and a half distant.	

13. Admit I sail away from a certain Port S. S. W. 50 Leagues, and thence again W. by S. 30 Leagues, upon what Point have I made my Way good, and how far am I come from a Port?

As, admit I sail from A to D South-South-West 50 Leagues, and from D to E. West by South 30 Leagues, there is required the Course A or E, and distance A E.

From the South-South-West to the West by South are 5 Points; that is, $56^{\circ} 15' min.$ which is the Complement of the Angle at D, to $180^{\circ} deg.$ so that the Angle at D is $123^{\circ} 45' min.$ Wherefore here are given the two sides A D, and E D, and their contained Angle at D; therefore ———

As A D x E D, 80 Leagues,	co. ar.	8,09691
To A D ——— E D 20 Leagues,		1,30103
So $t \frac{1}{2}(A \times E) t 28^{\circ} 8' minutes,$		<u>9,71810</u>
To t F, $7^{\circ} 37' minutes;$		9,12604

Which subtracted, } A $20^{\circ} 31' minutes.$
there remains

Wherefore seeing the Course from A to D, is South-South-west, the Course from A to E is $20^{\circ} 31' minutes$ more westerly, that is South-West, 2° degrees Southerly; so that I have made my way good South-west, 2° degrees Southerly.

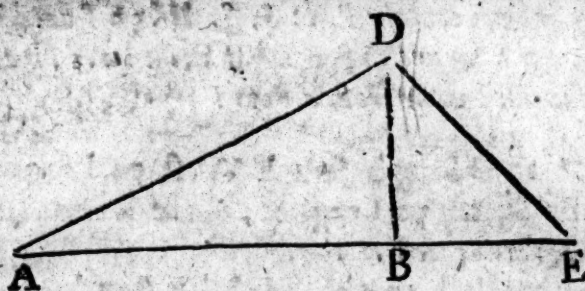
Secondly, for the Distance upon that Point.

As Sine the Angle found, $s A 20^{\circ} deg. 31' min.$ co. ar.	0,45534
To his opposite side given, E D, 30 Leagues,	1,47712
So Sine the Angle given, $s D 56^{\circ} 15' minutes,$	<u>2,91985</u>
To his opposite side required, A E, $71\frac{2}{3}$ Leagues,	1,85231
Which is the Distance from that Port.	

14. There

15. There are two Ports in one and the same Parallel or Latitude distant 64 Leagues, and there is certain Island more Southerly, distant from the Eastermost of these Ports 47 Leagues, and from the Westermost of them 34 Leagues: I demand the Course from the Eastermost Port to that Island?

Let the Eastermost Port be A, the Westermost E, both in one and the same Parallel A E, distant 64 Leagues, and let the



Island be D, distant from A 47 Leagues, and from E 34 Leagues, there is required the Course from A to D; that is, the Ang. at A, or the Comp. thereof.

By the 12th Case of Plain Triangles.

As the Distance of the Ports A E, 64 Leagues. *co. ar.* 8, 19, 382
To the Sum of A D, and E D, 81 Leagues, 1, 90848
So is the Difference of A D, and E D, 13 Leagues, 1, 11394

To a certain Line, A, $16^{\circ} \frac{454}{1000}$ 1, 21624
Which added to A E, is $80^{\circ} \frac{454}{1000}$
The half whereof is A B, $40^{\circ} \frac{227}{1000}$

Then by the 6th of Plain Triangles,

As A D 47 Leagues, Compl. Arithm. 8, 32790
To Radius;
So A B, $40^{\circ} \frac{227}{1000}$ 1, 60452

To *s c* A, 558 degrees 51 minutes, 9, 93242
That is, South-West and by West, 2 deg. 36 min. Westerly,
which is the Course from the Eastermost Port to the Island.

15. A Ship sails from one Port to a second S. S. E. 76 Leagues, and from thence to a third 54 Leagues, and from that third to the first 80 Leagues: I demand the Course from the second Port to the third, and from the third to the first.

This and the like are to be wrought as the former, which therefore we leave to your own Practice.

Of sailing by Mercator's Chart.

AND thus much of the *Plain Chart*; which, as it hath this Commodity, that it is most easy; so it hath some Discommodities intolerable: For there be very few places that can therein be expressed, according to their true Situation and Distance one from another; which as it is a great impediment in the Practice of Navigation, so it hath caused much confusion in the *Geographical* and *Hidrographical* Descriptions of Places; insomuch, as there are scarce extant any Descriptions of the *World*, or the Parts thereof, that are not pestered with notorious Errors; the greatest part of them hence arising. It is indeed ancient; and, till the *Sea-Compass* was known, it was the aptest *Chart* that could be used; because till then, Men were *Coasters*, and for the most part returned back the same way they went forth; and it may still serve without any great Error in such Places as are near the *Equinoctial*; also in many other Places for short Voyages, and even for long Voyages; provided that a Man be sure to return the same way that he went; or near the same: Otherwise, if he trust to the *Plain Chart*, he will be most grossly deceived many times in his Course a Point or two of his *Compass*, and in his Distance many hundred Miles. But in this *Sea-Chart* called *Mercator's*, all or any parts of the *World* may be set down, according to their *Longitudes*, *Latitudes*, *Courses* and *Distances*, as truly and far more conveniently for the *Mariners* use, than upon the *Globe* it self; so that it will truly shew the *Direction* and *Distance* from place to place, which way soever a Man goes or returns.

Some Men will say, that in divers *Reckonings* by *Mercator's Chart*, they have found as little certainty, as by the *Plain Chart*; which I deny not; but the Reason is, because there are few or

no *Charts* made directly according to this Projection. It will be said, Yes, there are many; and that a Man may have of them whensoever he will bespeak them. I grant a Man may have those which are so called; but that which is such indeed, must not only have Meridians, Parallels, and Rumbs drawn according to this Projection; but the Sea-Coasts must be inserted by the like Art and Means as they have formerly been inserted into the common *Sea-Chart*: otherwise, he that shall transfer Places out of the common *Sea-Chart* into *Mercator's*, without due knowledge and Respect upon what Occasion, or for what Reason they were so placed in the common *Sea-Chart*, he shall transfer the Errors of the one into the other; and that sometimes with increase. Wherefore it requires more than an ordinary Judgment to draw a Plot directly according to this Projection for any Place or Places. And he must further know, or be made acquainted with the Reckonings of Mariners frequenting those Places; and that truly whether with Allowance or without, and whether agreeing or disagreeing with their Plots, and so comparing one thing with another, and weighing all in the ballance of a good Judgment, he shall be able to do it. The Ground of the Projection of this kind of *Charts* was pointed at by *Ptolomy* many hundred Years since; and according to that Ground, *Mercator* did of late Years set forth an universal Map of the World: Whereupon these have been called *Mercator's Charts*. But the Way how to describe them was first taught by that Learned Navigator of our Times, Mr. *Edward Wright*, in his Book of the *Correction of Errors in Navigation*. From whence also the Grounds and Reasons of these ensuing Problems are to be taken: and if we would be as grateful to our own Country-men as to Strangers, I see not but we may ascribe as much to him in this, as to any other Man. Now that which he has shewed to perform by the *Chart* it self, we will here shew to work by Doctrine of Plain Triangles, using the Help of the Table of *Logarithm Tangents*, beginning at 45 deg. 00 m. and so increasing upwards, accounting every 30 m. to be one deg. of the Meridian Line, as the Tangent of 45 deg. 30 min. to be one degree of the Meridian Line, the Tangent of 46 deg. 0 min. to be 2 deg. 0 min. of the Meridian Line, and so forwards:

so that every *min.* is two *min.* of the Meridian Line; and although that these be not the same Meridional Parts, that are in the Doctrine of Triangles, yet they proceed in the same proportion as the *Secants* added together do, and shall produce the same Solution to every Problem of Sailing by Mercator's Chart, as the other Tables do. But because in this small Volume we have but one *Chiliad* of 1000 *Logarithms*, I shall work by Leagues; and not by Miles or Minutes; yet I shall resolve the same Problems of sailing by Mercator's Chart, that are set down in the Doctrine of Triangles.

Prop. I. To find by these Tables what Meridional Leagues are contained in any difference of Latitude.

TO perform this Problem, we must take half of each of the given Latitudes, and to each half add 45 deg. 0 min. and the Sum shall shew us the *d.* and *m.* where we shall find the Tangent to give us the Merid. Leagues from the Equinoctial to each Lat. But it shall suffice to subtract the lesser Tang. out of the greater, and to multiply the Difference or Remainder by 10, and to divide that Product by 376, and the Quotient shall be the Meridional Leagues contained between the two Latitudes.

As, let one Latitude be 50 deg. 0 min. the other 32 deg. 35 min. The half of 50 deg. 0 min. is 25 deg. 0 min. to which add 45 deg. 0 min. the Sum is 70 deg. 0 min. which are 43893.

The half of 32 deg. 37 min. is 16 deg. 17 min. and an half, to which add 45 deg. 0 min. the Sum is 61 deg. 17 min. $\frac{1}{2}$ where we must look the equal parts, viz. at the Tangent of 61 deg. 17 min. and a half, which are 26147; which subtract from 43893, and the Remainder is 17746, which multiplied by 10, is 177460; and that divided by 376, the Quotient is 472 Leagues nearest, which are the Meridional Leagues contained between the two Latitudes; and the like is to be done for all Latitudes whatsoever.

Now although this way doth a little differ from that Way done by Meridional Parts, yet the Difference is of no validity to breed any considerable Error in the Course, and so by consequence not in the Distance; and therefore I desire a favourable Construction of it.

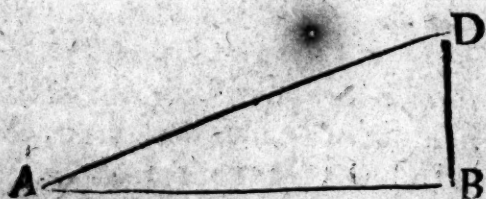
Prob.

Prob. II. *The Latitude, and Difference of Longitude of two Places given; to find the Rumb and Distance.*

TO the intent the Application may be the more evident, we will give Examples of two Places expressed in the Chart.

As, admit the Latitude of the *Lizard* to be 50 d. 0 min. the Latitude of *Summer-Islands*, sometimes called the *Bermudas* 32 d. 25 m. and the Difference of Longitude to be 70 d. 0 min. the *Summer-Islands* being so much to the Westward of the *Lizard*; I demand the Course, and the Distance from the one to the other.

As in this right angled Triangle A D B. Let A represent the *Lizard*, and A B the Parallel thereof: D *Summer-Islands*, and D B the Meridian thereof.



Then is there given D B the Difference of Latitude 17 deg. 35 min. and A B the Difference of Longitude 70 degrees 0 min. whereby the Angles and Hypotenusal should be

found by the fourth and second Cases of Plain Triangles. But because in this kind of Projection, the Degrees of Longitude and Latitude are not equal; (except in Places near the Equinoctial,) the Degrees of Latitude at every Parallel exceeding the Degrees of Longitude in such proportion as the Equinoctial exceeds that Parallel; therefore these Differences of Longitude and Latitude must first be expressed by some one common Measure. And for that purpose, serves the Table of Tangents which sheweth how many equal Leagues are from the Equinoctial to every Degree of Latitude: namely, of such equal Leagues, as a Degree of Longitude doth contain 20.

Wherefore multiplying 70 d. 0 m. the Difference of Longit. by 20. I have 1400 for the Meridional Leagues contained in the Difference of Longitude; also (by the last Problem) I find the Meridional Leagues contained in the Difference of Latitude to be 472, so that DB is 472 Leag. and AB 1400 such Leagues.

Therefore

by Mercator's Chart.

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Therefore by the 4th Case of Plain Triangles;

As the Difference of Latit. in Leag. D B 472 co. ar. 732606
Is in proportion to Radius,

So is the Difference of Longit. in Leag. A B 1400 314612

To the Tangent of the Rumb, \angle D 71 d. 21 m. 10,47218

Wich sheweth the Course from the Summer-Islands to the Lizard, to the East North-East, 3 d. 52 m. Easterly; or from the Lizard to the Summer-Islands, W. S. W. 3 d. 62 m. Westerly

Secondly, for the Distance in the Rumb,

Reduce the Difference of Latitude into Leagues, (multiplying the deg. by 20) and to the Product adding one third of the min.

Then by the 2d Case of Plain Triangles,

As Sine Comp. the Rumb \angle A, 18 d. 39 m. co. ar. 049514

To the Difference of Latitude D B, 352 Leagues, 254654

So is the Radius

To the Distance A D; 1100 Leagues, 304168

And this is the Distance measured in the Rumb; there is a heater cut between those two places, whereof we shall speak hereafter in *Great-Circle-Sailing*, which is by Segments of several Rumbs often changing the Course; but here, whensoever we speak of the Distance of two places, we mean their Distance measured in one Rumb.

Prob. 3. *The Latitude of two Places, and their Distance given; to find the Rumb and Difference of Longitude.*

Admitt I sail from the Lizard, being in the Latitude of 50 d. upon some Point to the Westward 1100 Leagues, and then find my self in the Latitude of 32 d. 25 m. I would know upon what Point I have made my way good, and how much I have altered my Longitude.

The Difference of Latitude D B, is 17 d. 35 m. which reduced into Leagues, is 352 Leag. (as in the foregoing Type.)

As the Distance sailed A D, 1100 Leag. co. ar. 695832

Is in proportion to Radius,

So is the Difference of Latitude D B, 352 Leagues, 254654

To Sine Complement the Rumb \angle A, 18 d. 39 m. 9,50486

That is, West-South-West 3 d. 51 m. Westerly.

B

Secondly;

Secondly, for the Difference of Longitude.

Find by the first Prob. what Meridional Leagues are contained in the Difference of Latit. which are here 472, then say,

As Radius

To the Difference of Latitude in Leagues D B, 472 267394

So is the Tangent of the Rumb & D, 71 d. 21 m. 47218

To the Difference of Longit. in Leagues A B, 1400 314612

Which Leagues reduced into Degrees, dividing them by 20, the Quotient is 70 d. the Difference of Longitude required.

Prob. 4. By the Rumb, and Latitude of two Places given, to find their Distance, and Difference of Longitude.

A Dmit I sail from the Lizard, being in the Latitude of 50 d. West-South-West 3 d. 51 m. Westerly, till I find my self in the Latitude of 32 d. 25 m. I demand how far I have sailed, and how much I have altered my Longitude?

The Distance is found as in the latter part of the 2d Prob. thus; The Difference of Latit. converted into Leagues, is 352. Say then;

As Sine Comp. the Rumb & A, 18 d. 39 m. 9,49514

To the Difference of Latitude D B, 352 Leagues, 254654

So is Radius,

To the Distance AD, 1100 Leagues, 394168

And so much is the Distance; the Difference of Longitude may be found as in the latter part of the 3d Problem, saying;

As Radius, to the Difference of Latitude in Meridional Leagues, so is the Tangent of the Rumb to the Difference of Longitude in Leagues.

Prob. 5. By the Difference of Longitude, Rumb, and one Latitude, to find the other Latitude, and the Distance.

A Dmit I sail from the Lizard, being in the Latitude of 50 deg. West-South-West, 3 deg. Westerly, till I have altered my Longitude 70 deg. How much have I laid the Pole, and how far am I from the Lizard?

Reduce the Difference of Longitude into Leagues by 20, and so it makes 1400; then say,

As the Tang. of the Rumb & D 71 d. 21 m. co. ar. 9,52829

To the Difference of Longit. in Leagues A B, 1400 314612

So is Radius

by Mercator's Chart.

To the Difference of Latitude in Leagues DB, 472 267441.
Which 472 Leagues multiplied by 376, and the Product
177472, & that divide by 10, and the Quotient is 17747, which
I subtract from the equal parts of the Lat. of 50 d. 0 m. which
we found by the first Problem, to be at the Tang. of 70 d. 0 m. viz.
43893, and the remainder is 26146, which I seek in the Tan-
gents; and find it in the Tangent of 61 deg. 17 min. and a half,
from which I subtract 45 deg. 0 min. and the remainder is 16
deg. 17 min. and an half, which being doubled, is 32 deg. 35 min.
the Latitude of the Place to which I am come.

Secondly, for the Distance.

Having already the Rumb, and Difference of Latitude, it may
be found as in the second and fourth Problem; saying,

As Sine Comp. the Rumb s A 18 d. 39 m. co. ar.	0,49514
To the Difference of Latitude, DB 352 Leagues,	<u>254654</u>

So is Radius,

To the Distance,	AD 1100 Leagues	304168
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Prob. 6. By the Rumb, the Distance, and one Latitude given, to find
the other Latitude, and the Difference of Longitude.

Admit I sail West South-west 3 d. 51 m. Westerly, 1100
Leagues, and then find my self in the Latitude of 32 d.
25 m. I demand the Latitude of the Place from which I came,
and the Difference of Longitude between that and this?

First, for the Difference of Latitude?

As Radius

To the Distance run AD 1100 Leagues	304168
So Sine Comp. the Rumb s A, 18 d. 39 m.	950486
To the Difference of Latitude, DB 352 Leagues,	<u>254654</u>

Which 352 Leagues converted into degrees, is 17 d. 35 m.
the Difference of Latitude required; which added to 32 d. 25 m.
makes 50 d. 0 m. the Latitude of the first Place.

The Difference of Longitude is found, as before in the third
Problem; saying,

As Radius to the Difference in Latitude in Meridional Leag.
so is the Tangent of the Rumb, to the Difference of Longitude
in Leagues.

And thus the Difference of Longitude will be found, as in this
Example, to be 70 d. 0 m.

If at any time you desire to convert this Difference of Longit. found in any Parallel into Leag. you may do it after this Example

7. Admit there be two Places, both in the Parallel of 50 d. which differ in Longitude 70 d. 0 m. I demand the Distance of these two Places

First, It is to be understood that the Leagues of Longitude in any Parallel, are in proportion to the Distance in Leagues as the Equinoctial is to that Parallel, or as the Semidiameter of the one is to the Semidiameter of the other : That is,

As Radius is in proportion

To Sine Comp. Latitude *s. c.* 50 d. 0 m. 980807

So is the Difference of Longitude 1400 Leag. 314612

To the Distance in that Parallel 900 Leag. 295419

A Table of the Angles which every Rumb or Point of the Compass makes with the Meridian.

North.	South.	D.	M.	South.	North.	Point.
		2	49			
		5	38			
		8	26			
N by E	S by E	11	15	S by W	N by W	1
		14	4			
		16	53			
		19	41			
NNE	SSE	22	30	SSW	NNW	2
		25	19			
		28	8			
		30	56			
NE by N	SE by E	33	45	SW by S	NW by N	3
		36	34			
		39	23			
		42	11			
NE	SE	45	0	SW	NW	4
		47	49			
		50	37			
		53	26			
NE by E	SE by E	56	15	SW by W	NW by W	5
		59	4			
		61	52			
		64	41			
ENE	ESE	67	30	WSW	WNW	6
		70	19			
		73	7			
		75	56			
		78	45			
E by N	E by S			W by S	W by N	7
		81	34			
		84	22			
		87	11			
East	East.	90	0	West	West.	8

Propositions in ASTRONOMY and NAVIGATION, performed by the Tables of Artificial Sines, Tangents and Logarithms.

Prop. 1. *The Sun's Place being known, to find his Declination.*

As the Radius to the Sine of the Sun's greatest Declination 23 d. 30 m. so is the Sine of the Sun's Distance from the next Equinoctial Point, to the Sine of his present Declination. So the Sun being in 20 d. 36 m. of *Taurus*, his Declination will be found to be 17 d. 68 m. almost.

Prop. 2. *The Sun's Declination being given, to find his Place in the Zodiack.*

As the Sine of the Sun's greatest Declination is to the Radius, so is the present Declination to the present Place. So the Sun having 17 d. 58 m. of North Declination, his Place will be found to be in 20 d. 36 m. of *Taurus*, or 9 d. 24 m. of the parallel Sign *Leo*.

Prop. 3. *The Latitude of the Place, and Declination of the Sun given, to find his Amplitude.*

As the Co-sine of the Latitude is to the Radius, so is the Sine of the Declination to the Sine of the Amplitude. So the Sun having 11 d. 48 m. of North Declination, his Amplitude will be found to be 19 d. 15 m. North also: For this is general, that if the Sun be in Northern Signs, as in *Aries, Taurus, Gemini, Leo, Virgo*, he hath North Declination, and North Amplitude. And in Southern Signs, as in *Libra, Scorpio, Sagittar, Capricorn, Pisces, or Aquarius* South Declination, and South Amplitude.

Prop. 4. *The Sun's Declination and Amplitude given, to find the Height of the Pole.*

As the Sine of the Amplitude to the Degree of the Declination, so Radius to the Co-sine of the Latitude. So the Declination being 11 d. 41 m. and the Amplitude 19 d. 17 m. the Height of the Equinoctial will be found to be 38 d. 19 m. whose Complement 51 d. 41 m. is the Height of the Pole.

Prop. 5. *The Latitude of the Place, and Declination of the Sun given, to find his right Ascension.*

AS Radius to the Tangent of the Sun's Distance from the next Equinoctial Point, so is the Co-sine of the greatest Declination to the Tangent of the right Ascension.

So the Sun being in 20 d. of Taurus (that is 50 d. from the next Equinoctial Point Aries) his right Ascension will be found to be 47 d. 32 m.

Prop. 6. *The Latitude of the Place, and Declination of the Sun given, to find the Ascensional Difference, which is the time of the Sun's rising or setting.*

AS the Co-tangent of the Latit. is to the Tangent of the Declination, so is Radius to the Sine of the Ascensional Difference; so the Latitude being 51 d. 30 m. North, and the Declination 20 d. the Difference of Ascension will be found to be 27 d. 14 m. which reduced into time (by allowing 15 d. for one hour and 4 m. of time for 1 d.) doth give 1 hour and almost 49 m. for the Difference between the Sun's rising or setting, before or after the hour of six, according to the time of the year; that is, when the Sun is in Northern Signs, the Sun rises before, and sets after six; and in Southern Signs, he rises after, and sets before six.

Prop. 7. *The Amplitude, and Difference of Ascension of the Sun or Star given, to find its Declination.*

AS the Sine of the Ascensional Difference is to the Co-sine of the Amplitude, so is the Radius to the Co-sine of the Declination.

So the Ascensional Difference being 27 d. 31 m. shews the Sun rises at 4 a clock and 10 m. which converted into degrees, makes 62 d. 30 m. and the Amplitude 23 d. 38 m.

The Declination will be found to be 20 d. 10 m.

Prop. 8. *The Latitude and Declination given, to find the Meridian Altitude.*

IF the Sun hath North Declination, add the Complement of the Latitude to the Declination, the Sum is the Merid. Altitude; but if the Sun hath south Declination, subtract the Declination from the Complement of the Latitude, the residue is the Meridian Altitude.

So the Latitude being $51^{\circ} 40'$, the Complement thereof is $38^{\circ} 20'$. and let the Declination be $23^{\circ} 30'$ North. Add $38^{\circ} 20'$ to $23^{\circ} 30'$. the Sum is $61^{\circ} 50'$, the Meridian Altitude. But if the Declination had been $23^{\circ} 30'$ South, subtract $23^{\circ} 30'$ from $38^{\circ} 20'$. the Remainder would be $14^{\circ} 50'$ for the Meridian Altitude.

Prop. 9. The Latitude and Declination known, to find the Height of the Sun at any Hour.

As the Co-sine of the Hour from the Meridian is to Radius, so the Tangent of the Latit. to the Tang. of a fourth Ark. So in the Latitude $51^{\circ} 30'$. and one Hour from the Meridian, (which is either 11 or 1 a Clock) this fourth Ark will be found to be $52^{\circ} 28'$.

Then consider the Declination of the Sun, and the Hour proposed, if the Latitude and Declination be alike, both North, as with us, and the Hour proposed be between Noon & six, take the Declination out of the fourth Ark, the Remainder shall be a fifth Ark: But if the Hour fall between six and midnight, or the Latitude and Declination be unlike, one North and the other South, add the Declination to the fourth Ark, and the Sum shall be a fifth Ark; if the Sum exceed 90° . take it from 180° . the Remainder is the fifth Ark. The fifth Ark being found, say,

As the Sine of the fourth Ark, to the Sine of the Latitude, so the Co-sine of the fifth Ark to the Sine of the Altitude.

So the Latitude being $51^{\circ} 30'$ North; the Declination $23^{\circ} 30'$ North; if it be required to find the Sun's Altitude at 7 in the Morning, you shall find it to be $27^{\circ} 17'$.

Prop. 10. The Latitude of the Place, the Declination of the Sun, and Altitude of the Sun given; to find his Azimuth.

Consider whether the Sun's Declination be North or South; so have you his Distance from the Pole: Add the Sun's Distance from the Pole, the Complement of your Latitude, and the Complement of your Altitude all three into one Sum, and from half that Sum subtract the Distance of the Sun from the Pole, and note the Difference: Then say,

1. As Radius to the Co-sine of the Altitude, so the Co-sine of the Latitude to a fourth Sine.

B 4

2. As

2. As this fourth Sine is to the Sine of the half Sum, so is the Sine of the Difference to a seventh Sine; unto which seventh Sine, if you add the Sine of 90 d. half that Sum will be the Sine of an Ark, whose Complement being doubled, is the Azimuth from the North of the Meridian.

So if the Latitude be 51 d. 30 m. North, the Declination 78 d. South, and the Altitude 12 d. the Azimuth from the North part of the Meridian will be found to be 140 d.

Prop. 11. *The Latitude given, to find how many Minutes or Miles of the Equinoctial make 1 deg. of Latitude in any Parallel.*

As the Sine of 90 d. is to the number of 60 Miles, so the Cosine of the Latitude to the Miles answerable to a d. in the Latitude desired.

So in the Latitude of 51 d. 40 m. 37 Miles will answer to 1 d. in the Longitude.

Prop. 12. *The Course and Distance given, to find the Difference of Latitude.*

As the Sine of 90 d. to the Logarithm of the Miles run, so the Sine of the Courses distance from East to West, to the difference of Latitude.

So if the Course be W. S. W. (which is 22 d. 30 m. from the West) the Miles 225; the difference of Latitude will be 1 d. 26 m.

Prop. 13. *The Course and Distance given, to find the Difference of Longitude.*

As the Sine of 90 d. is to the Miles run, so is the Sine of your Course from South to North, to the Miles you are departed from your first Meridian.

So if the Course be N. W. by N. (which is 33 d. 45 m. from the North) the Miles run 180, the number of Miles which you are departed from the Merid. will be found to be 100, which if you divide by the number of Miles answerable to a d. of Longitude in the Latitude you then find your self to be, the Quotient gives you the d and m. of Diff of Longit.

Prop. 14. *The Distance and Departure from the Meridian given, to find the Course.*

As the Miles run, to the Sine of 90; so the Departure from the Meridian, to the Sine of your Course from N. to South.

So

So if the Departure from the Meridian be 75 Miles in running 150 miles, the Course steerd is 30 d. which is S. W. by S. fourtherly.

Prop. 15. *The Latitude of the Place, the Declination and Altitude of the Sun given; to find the Hour of the Day.*

Add the Sun's Distance from the Pole, the Complement of the Latitude, and the Complement of the Altitude into one Sum, and from half the Sum subtract the Complement of the Altitude, noting the Difference. Then say,

1. As Radius to the Sine of the Sun's Distance from the Pole, so the Co-sine of the Latitude to a fourth Sine. - - - Then,

2. As this fourth Sine, to the Sine of the half Sum, so the Sine or the Difference, to a seventh Sine; unto which seventh Sine, if you add the Sine of 90 d. half that Sum will be the Sine of any Ark; whose Complement doubled, and converted into Time, is the Hour required.

So if the Latitude be 51 d. 30 m. the Declination 20 d. Northward; and the Altitude 12 d. the Time will be found to be 6 Hours 24 Minutes almost.

The Use of the following Tables in Questions that concern Geography.

THough there be divers ways to find the Distance of Places, viz. by the Globe, by Maps, Geometrically, &c. yet the most exact of all other, it by *Trigonometry*: which way we will here lay down in three Propositions.

Prop. 1. *Two Places differing only in Latitude, to find their Distance.*

In this Proposition there are two Varieties, viz.

1. If the two Places propounded, lie under one and the same Meridian, and both of them on one side of the Equinoctial, you must subtract the lesser Lat. from the greater, and the Remainder converted into Miles (by allowing 60 Miles to a d.) will be the Distance required.

Example.

Vicentia and *Augusta* lie under one and the same Meridian, and both on the North-side of the Equinoctial: *Vicentia*, having 44 d. 55 m. Latitude, and *Augusta* 47 d. 42 m. Latitude, the Difference of Latit. is 2 d. 47 m. which converted into Miles,

Miles, multiplying it by 60, and adding thereto the odd min. maketh 167 Miles, and that is their Distance.

3. If one Place lie on the North, and the other on the South-side of the Equinoctial; (yet both under the same Meridian) you must then add both Latitudes together, and the Sum converted into Miles, will give their Distance.

Prop. 2. Two Places differing only in Longitude being given, to find their Distance

In this Proposition also there are two Varieties.

1. If the two Places propounded lie under the Equin. then the Difference of their Long. reduced into Miles (allowing 60 Miles to a Degree) giveth the Distance of the Places required.

Example. It is required to know the Distance of the Island Sumatra from the Island St. Thoma, both lying under the Equin. the Island Sumatra hath Longit. 137 d. 10 m. and the Island of St. Thoma hath Long. 33 d. 10 m. therefore the Difference of their Longit. is 104 d. which multiplied by 60, maketh 6240 Miles, which is the Distance of the said Places.

2. But if the two Places propounded differ only in Longitude, and lie not under the Equinoctial, but under some other intermediate Parallel, between the Equinoctial and one of the Poles; then to find their Distance, the Proportion will be,

As Radius, or 90 d. is to the Co-sine of the common Latit. So is the Sine of half the Difference of Longitude to the Sine of half their Distance.

Example. The Cities of Compostella and Constantinople have both one Latitude, viz. 43 d. 0 m. but differ in Longitude 43 d. 15 m. The Complement of their Latitude is 47 d. and the half Longitude is 21 d. 37 m. 30 sec. therefore the Operation is thus to be framed;

As the Radius, or Sine of 90 d.	10,00000
To the Co-sine of the common Latitude 47 d.	9,86412
So the Sine of the half Difference of Long. 21 d.	
37 m. 30 sec.	9,56647

To the Sine of half their Distance,

Whole Arch 15 d. 38 m. being doubled, giveth 31 d. 16 m. which converted into Miles (as before is taught) giveth 1876; which is the Distance between the two Places required.

Prop. 3.

Propositions Geographical

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Prop 3. Two Places being given, which differ both in Longitude and Latitude, to find their Distance.

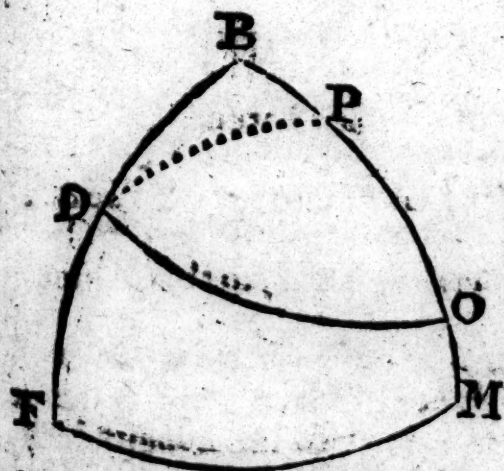
In this Proposition is contained three Varieties:

1. If one Place be under the Equinoctial Circle, and the other toward either Pole, then the Proportion is,
As the Radius, or Sine of 90 degrees
Is to the Co-sine of the Difference of Longitude:
So is the Co-sine of the Latitude given,
To the Co-sine of their Distance required.

Example.

If it were required to find the Distance of the Island of St. Thoma, which lies directly under the Equinoctial, and hath Longitude 38 d. (and the City of London, which hath 51 d. 30 m. Latitude, and 20 d. Longitude) their Distance will be found to be 3222 Miles.

2. If both the Places propounded be without the Equinoctial, and on the Northern or Southern side thereof, then the Proportion must be wrought at two Operations; and because there is some difficulty therein, we have added the following Figure, which will make it perspicuous to the meanest Capacity;



Let D represent London, whose Latitude is FD, 51 d. 30 m. and Longitude 20 d. 0 m. And let O represent Jerusalem, whose Latitude MO is 31 d. 40 m. and Long 60 d. which being known, you have given (1) the side BD the Complement of the Latitude of London, 38 d. 30 m. (2) the side BO the Complement of the Latitude of Jerusalem, 58 d. 20 m. (3) The Angle DBO (whose measure is FM) the Difference of Latitude 46 d. 0 m. and it is required to find the side DB; therefore the Proportion is.

1. As

1. As the Radius B M 90 deg.

10,0000000

To the Co-sine of D B O 44 d.

9,8417713

So is the Tangent of D B 38 d. 30 m.

9,9006052

To the Tangent of B P 28 d. 55 m.

9,7423504

Which being subtracted from B O 38 d. 20 m. there remains
O P 29 d. 25 m. Then say,

2. As the Co-sine of B P 61 d. 5 m.

9,9421688

To the Co-sine of P O 60 d. 35 m.

9,9400535

So is the Co-sine of D B 51 d. 30 m.

9,8925443

19,8335978

To the Co-sine of D O 51 d. 9 m.

9,8914290

Whose Complement is 38 d. 51 m. which converted into
Miles, as before is taught, *facit* 2331 Miles; and such is the Di-
stance required.

3. If the two Places propounded differ both in Longitude
and Latitude, and be both of them without the Equinoctial,
and one of them towards the North, and the other towards
the South Pole; then the Proportion is,

1. As the Radius is to the Co-sine of the Difference of Lon-
gitude;

So is the Co-tangent of one of the Latitudes to the Tangent
of another Ark.

Which being subtracted out of the other Latitude, and 90 d.
added thereto; say,

2. As the Co-sine of the Ark found, is to the Co-sine of the
Ark remaining;

So is the Co-sine of the Latitude first taken, to the Co-sine of
the Distance.

These are all the Varieties that can possibly happen in any
Proposition concerning the Distance of Places, and is the ex-
actest way that can be invented, provided the Longitude and
Latitude be truly given.

A Table of the *Latitude* and *Longitude* of the Principal Ports, Capes, and Islands in the World, beginnig from the Meridian of *Pico Teneriffa*: Newly Corrected.

Note, the Places marked with S, are in South Latitude, the rest North.

	<i>Latitude</i>		<i>Longit.</i>	
	D.	M.	D.	M.
Point Look-out in Greenland	77	10	39	55
Ice Point in Nova Zembla	77	5	98	55
Archangel	65	30	64	35
North-Cape	71	38	44	45
Naze of Norway	58	11	33	22
Stockholm	59	20	39	5
Copenhagen	55	43	33	5
Elsenore	56	40	25	48
The Texel	53	3	26	57
Amsterdam	52	21	25	00
The Brill	51	55	23	50
Calice	51	00	22	57
Merchants Fore land in Island	63	36	358	5
Shetland	60	22	14	40
Isles of Orkney	58	50	13	30
Caenness	58	41	15	25
Buchaness	58	4	16	47
Tinmouth	55	12	18	55
Flamborough Head	54	12	19	23
Orfordness	52	24	21	49
London	51	32	20	25
The North-Foreland	51	36	21	25
The South-Foreland	51	26	21	3
Dongeness	41	12	20	37
Ile of Wight	50	41	19	5
Portland	52	37	18	6

	Latitude.		Longitude.	
	D.	M.	D.	M.
Fyal	38	55	348	31
Tercera	39	56	151	90
Pico Teneriffe	28	42	00	00
Madera	32	25	00	05
Canaria	28	00	00	55
Isle de Mayo	14	49	353	17
Isle de Sall.	16	50	353	44
Cape Corientes in East-India	23	36 S	54	30
Cape de Gardein	12	15	74	55
Cape Besalgate	22	26	84	55
Surrat	21	0	97	00
Goa in East-India	15	40	97	55
Cape Comorin	07	28	100	35
South-end of St. Lawrence	25	30 S	64	30
North end of St. Lawrence	12	15 S	69	30
Bantam in Java	06	16 S	125	40
Acham at the N. W. Point of Sumatra	05	55	116	05
Macasser on the South-end of Celeb	05	30 S	139	40
North Point of Jaram	40	05	163	20
Straits of Anian in the South-sea	57	14	241	26
West Entrance of Magellan	52	53	301	00
Surinam	06	00	303	40
Cape of Florida	24	30	295	40
Cape Fair	34	08	199	40
Cape Charles	37	22	302	15
Plimouth in New-England	42	00	311	49
Cape Cod	41	50	313	05
Hudson's Straits	60	30	308	55
Bermudas	32	30	318	05
St. Christopher's	17	30	319	20
Barbadoes	13	24	319	45
Mevis	16	42	317	48
Cape Ficolai on Hispaniola	10	57	304	55
Port Royal in Jamaica	18	15	297	10
The Haven on Cuba	28	18	194	29

	Latitude		Longit.	
	D.	M.	D.	M.
The Start	59	44	17	29
The Lizard	59	19	15	00
Islands of Silly	59	36	14	00
St David's Head	51	40	15	31
Holy-Head	54	30	15	57
Isle of Man	54	11	15	58
Fair Foreland in Ireland	55	21	14	20
Slieve Head	53	02	10	13
Cape Clear	51	03	10	41
Dublin	53	11	13	25
Slain Head	50	00	18	24
Cape Hage	50	00	16	39
Garussey	49	39	19	54
Jersey	49	26	16	20
Ushant	48	36	12	50
Brest	47	41	16	53
Cape Ortegal	44	04	19	50
Cape Finisterre	43	06	08	32
Lisbon	38	40	09	55
Cape Vincent	37	00	19	55
Straits of Gibraltar	35	50	13	10
Cape de Gata	36	35	09	23
Cape Melle	43	39	19	30
Ligorn	43	18	31	25
Rome	42	54	34	13
Naples	41	05	36	17
Scanderoon	36	56	63	31
Tunis	35	18	30	25
Tangier	25	25	13	20
Cape Passaro in Sicily	36	30	36	31
Zant	36	42	41	48
Cape de Geer	29	56	06	38
Cape de Verede	14	26	359	00
Cape Negro	16	05	30	30
Cape Bonâ Esperance	34	308	40	5

The Use of the Tables of the Sun and Stars Right Ascension.

AT the end of this Book you have two Tables, the one shewing the Right Ascension of the Sun every Day in the Year; the other shewing the Right Ascension and Declination of certain of the most eminent fixed Stars. I will in this place shew how by the joint Use of these two Tables you may find when any Star mentioned in the Table of Stars will come to the Meridian, and the Rule will hold general for any whose Right Ascension and Declination is known. The manner of working is as followeth.

The R U L E.

Subtract the Right Ascension of the Sun from the Right Ascension of the Star, (whose time of coming to the Meridian is required) the Remainder is the time of the Star's said coming to the Merid. Afternoon: But if the Right Ascension of the Star be less than the Right Ascension of the Sun, add twenty four Hours thereunto, and subtract the Right Ascension of the Sun there-from, the Remainder is the time of the Stars coming to the Meridian.

Example.

Upon the 11th of December, it is required to know when the Bull's Eye comes to the Meridian: By your Tables of the Sun's Right Ascension, you find that the Sun's Right Ascension, on the 11th of December, is 17 h. 59 m. and by your Table of Stars you find the Right Ascension of the Bull's Eye to be 4 h. 10 m. Now (according to your Rule) because the Right Ascension of the Sun is more than the Right Ascension of the Star, and Subtraction cannot be made, you must add 24 h. to the Star's Declination, so will the Sun be 28 h. 10 m. from which take 17 h. 59 m. the Right Ascension of the Sun, the Remainder will be 10 h. 11 m. at which time the Bull's Eye will come to the Meridian on the 11th of December after the Sun: that is; at 11 m. past 10 at night the Bull's Eye will be due South; the like of any other Star whose Right Ascension is known. See the following Work.

Right

To find the Hour of the Night.

31

	ho.	min.
Right Ascension of the Sun on the 11th of December,	17	59
Right Ascension of the Bull's-Eye,	4	10
Twenty four Hours added,	24	00
		<hr/>
The Sum	28	10
The Sun's Right Ascension subtracted,	17	50
		<hr/>
Remains,	10	11

The true Time that the *Bull's. Eye* will come to the Meridian.

This Rule here delivered is of Excellent use for *Sea-men*, thereby to find their Latitude; for it is to be noted, That the Rules which you observe for finding of your Latitude by the Sun, the same may be performed by the Stars, they being upon the Meridian, as is already noted in the last Page of my *Doctrine of Triangles*; to which I refer you.

The Altitude of any known Star being given, to find thereby the Hour of the Night.

By the former Rule find the Time of the known Star's coming to the Meridian on the Day proposed. Then seek out the horary Distance of that Star from the Meridian, which may be found by the same Rule as you find the Hour of the Day by the Sun, a. in Prop. 15.

These things being found, if the Star be on the East-side, not yet come to the Meridian, the Difference of those two Numbers of Hours is the Hour of the Night; if the Star be Westward past the Meridian, the Sum of those Numbers of Hours is the Hour of the Night.

Of finding the Variation of the Compass.

By the third Prop. before-going, you are taught to find the Sun's Amplitude; that is, how far distant the Sun riseth or setteth from the True East or West Points of the Horizon.

Thus if the Latitude given were 51 d. 32 m. and the Sun's Declination 15 d. 10 m. North, the Amplitude will be found to be 24 d. 25 m. North, because the Sun's Declin. was North.

Of the Amplitude thus found, there is often use made at Sea, for finding the Variation of the Compass; which is done after this manner:

Supposing the Circumference or outermost Edg of the
C Card

Card or Fly of the Compass to be divided into 370 deg. and the Points of the Needles to be placed directly under the *Flower-de-Luce*. or North and South Points; you are to observe at Sun-rising or setting, how many deg. the Sun is from the East or West Points of the Compass, which number of deg. if they agree with the Amplitude found by this Position, as it is before shewed, and be on the same side, then hath the Compass no Variation; but if they differ, look how many deg. that Difference is, so much is the Variation.

As for Example.

Admit I find the Amplitude to be 21 deg. 52 m. Northerly, then I know that the Sun should set almost 25 d. from the West to the Northward; but observing at Sun-setting with my Compass, admit I find it to set but 19 deg. from the West-point of my Compass to the Northwards, then hereby I gather that the Variation of my Compass is almost 6 deg. And thus you may find how much the Variation of the Compass is, Now,

To find which way the Compass varieth.

If the deg. of the Compass, which directly respects the Sun at his rising and setting, (namely, the deg. of Amplitude, found as before) be more towards the right-hand than the Sun-rising or setting, the Variation is Easterly; but if it be more towards the left-hand, the Variation is westerly; because when a Man's Face is towards the North, the East is on his right-hand, and the West on his left.

As in this Example; I find by the Amplitude, that the Sun should set almost 25 deg. from the West-point of my Compass Northerly; but setting the Sun, I see that the 25 d. of my Compass is more towards my right-hand than the place of Sun-set; therefore I conclude that the Variation is Easterly.

And thus is the Variation of the Compass found to be almost 6 d. Easterly; so that the North point of the Compass shews not the true North, but points almost 6 d. to the Eastward of the North; and consequently all the other Points of the Compass direct more towards the right-hand than they should do by almost 6 d. And the like in all Points to be understood, if the Observation had been made at Sun-rising.

Note; It is the fittest to make these Observations when the Sun

Sun seems to be a little above the Horizon, namely, when the lower edg of the Sun seems almost to touch the Horizon; for then the Sun is in the Horizon, though by reason of his Refraction and Parallax, he seems to be above it.

By the *Altitude* of any two known fixed Stars taken when they are both in the same *Azimuth*, to find the Height of the Pole.

First say, As the Sine of the Difference of the Stars Altitudes is to the Sine of the Difference of their Right Ascension; so is the Sine of the nearer Stars Distance from the apparent Pole to the Sine of an Angle to be kept.

Again; Compare the farthest Star's Distance from the Pole, with the Distance from the Zenith; and say,

As the Radius is to the Sine of the Complement of the Angle kept, so is the Mangent of the lesser of the compared Arches to the Tangent of the first Base.

Subduct the first Base out of the greater of the two compared Arches; and the Remainder shall be the second Base.

Then lastly, say,

As the Sine of the Complement of the first Base is to the Sine of the Complement of the second Base, so is the Sine of the Complement of the lesser of the two compared Arches to the Sine of the Height of the Pole or Latitude.

The Description and Use of an Universal Almanack.

BEfore you can well make use of this Almanack, you must know on what Day of the Week the first Day of March falleth upon in any Year, which the Table adjoining plainly

A Table shewing what Day of the Week the first Day of March will fall upon for 12 Years.

1696 Sunday	1702 Sunday
1697 Monday	1703 Monday
1698 Tuesday	1704 Tuesday
1699 Wednesday	1705 Thursday
1700 Friday	1706 Friday
1701 Saturday	1707 Saturday

sheweth for 12 Years, viz. to the Year 1707; which Table may be continued so far as you please, by leaving out one Day between every fourth Year, as you see done in the Years of this Table.

The Day of the Week on which the 1st Day of March falls upon being known, the Day of the Month for ever may be easily found, as by the Example following will appear.

A Figure of the Universal Almanack.

March Nov.	August	May Janua	Octob.	April July	Septem. Decem.	June Febru.
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

The Uses of this Almanack are only two.

The first is, Any Day of the Week in any Month or Year being given, to know what Day of the Month it is.

The second Use is, Any Year and Day of any Month of that Year being given, to know what Day of the Month it is.

Example of the First. Let it be required to know what Day of the Month the first *Thursday* in *August*, the Year 1696, should be.

By the first Table you shall find the first of *March* was *Thursday*. Now look in the Almanack (at the head thereof) for the Month of *August*, under which you shall find these Numbers. 2, 9, 16, 23, 30; which denote, that the 2d. the 9th, the 16th, the 23d. and the 30th Days of *August* were *Wednesdays*, because the first of *March* was *Thursday*; then the 9th of *August* being *Thursday*, the 7th Day must be *Tuesday*, and so for any other Month. As in the Months of *April* or *July*, the 5th, 12th, 19th, and 26th Days of either of those Months are *Thursdays*.

Example of the Second. What Day of the Week will the 21st Day of *October* be in the Year 1698? the first of *March* in that Year will be *Saturday*; therefore the 4th, 11th, 18th, and 25th Days of *October* are *Saturdays*. Then the 18th being *Saturday*, the 21st will be *Tuesday*.

Thus for every Year, the Day of the Week the first of *March* is of, the Days under any Month of that Year are of the same Day of the Week, whether *Sunday*, *Monday*, or *Tuesday*, &c. and so for ever.

A
TRIANGULAR
CANON

Logarithmical:

OR A

TABLE

OF

Artificial *Sines*, *Tangents*, and the *Complements Arithmetical* of *Sines*, supplying
the Use of *SECANTS*.

To Radius 10, 00000, and every Degree
and Minute of the *Quadrant*.

L O N D O N,

Printed in the Year 1696.

° Sine.	Sine Comp.	Tang	Tangent Compl.	Com. Ar. of Sine.	Com. Ar. of Sine Co
0	1000000	0	Infinite	60 1000000	1000000
1	646372	999999	646372	1353627	59 353627
2	676475	999999	676475	1323524	58 323524
3	694084	999999	694084	1305915	57 305915
4	706578	999999	706578	1293421	56 293421
5	716269	999999	716269	1283730	55 283730
6	724187	999999	724187	1275812	54 275812
7	730882	999999	730882	1269117	53 269117
8	736681	999999	736681	1263318	52 263318
9	741796	999999	741796	1258203	51 258203
10	746372	999999	746372	1253627	50 253627
11	750511	999999	750512	1249487	49 249488
12	754290	999999	754290	1245709	48 245709
13	757766	999999	757767	1242232	47 242233
14	760985	999999	760985	1239014	46 239014
15	763981	999999	763982	1236017	45 236018
16	766784	999999	766784	1233215	44 233215
17	769417	999999	769417	1230582	43 230582
18	771899	999999	771900	1228099	42 228100
19	774247	999999	774248	1225751	41 225752
20	776475	999999	776476	1223523	40 223524
21	778594	999999	778595	1221404	39 221405
22	780614	999999	780615	1219384	38 219385
23	782545	999999	782546	1217453	37 217454
24	784393	999998	784394	1215605	36 215606
25	786166	999998	786167	1213832	35 213833
26	787869	999998	787870	1212129	34 212130
27	789508	999998	789509	1210490	33 210491
28	791087	999998	791089	1208910	32 208912
29	792611	999998	792613	1207386	31 207388
30	794084	999998	794085	1205916	30 205915
	Sine Compl.	Sine.	Tangent Compl.	Tang	Secans. Secans.

Sine.	Sine Comp.	Tang	Tangent Compl.	Com. Ar. of Sine.	Com. Ar. of Sine Co.
30 794084	999998	794085	1205914	30 205915	1000001
31 795508	999998	795509	1204490	29 204491	1
32 796886	999998	796888	1203111	28 203113	1
33 798223	999998	798225	1201774	27 201776	1
34 799519	999997	799521	1200478	26 200480	2
35 800778	999997	800780	1199219	25 199221	2
36 802002	999997	802004	1197995	24 197997	2
37 803191	999997	803194	1196805	23 196808	2
38 804350	999997	804352	1195647	22 195649	2
39 805478	999997	805480	1194519	21 194521	2
40 806577	999997	806580	1193419	20 193422	2
41 807649	999996	807653	1192346	19 192350	3
42 808696	999996	808699	1191300	18 191303	3
43 809718	999996	809721	1190278	17 190281	3
44 810716	999996	810720	1189279	16 189283	3
45 811692	999996	811696	1188303	15 188307	3
46 812647	999996	812650	1187349	14 187352	3
47 813581	999995	813585	1186414	13 186418	4
48 814495	999995	814499	1185500	12 185504	4
49 815390	999995	815395	1184604	11 184609	4
50 816268	999995	816272	1183727	10 183731	4
51 817128	999995	817132	1182867	9 182871	4
52 817971	999995	817976	1182023	8 182028	4
53 818798	999994	818802	1181196	7 181201	5
54 819610	999994	819651	1180348	6 180389	5
55 820407	999994	820412	1179587	5 179592	5
56 821189	999994	821195	1178804	4 178810	5
57 821958	999994	821964	1178035	3 178041	5
58 822713	999993	822719	1177280	2 177286	6
59 823455	999993	823462	1176507	1 176544	6
60 824185	999993	824192	1175807	0 175814	6
Sine. Comp.	Sine.	Tangent Comp.	Tang	89 Secans.	Secans.

	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Si. Co.
0	824185	999993	824192	1175807	60	175814	1000006
1	824903	999993	824910	1175089	59	175096	6
2	825609	999992	825616	1174383	58	174390	7
3	826304	999992	826311	1173688	57	173695	7
4	826988	999992	826995	1173004	56	173011	7
5	827661	999992	827669	1172330	55	172338	7
6	828324	999992	828332	1171667	54	171675	8
7	828977	999991	828985	1171014	53	171022	8
8	829630	999991	829629	1170370	52	170379	8
9	830254	999991	830263	1169736	51	169745	8
10	830879	999991	830888	1169111	50	169120	9
11	831495	999990	831504	1168495	49	168504	9
12	832102	999990	832112	1167887	48	167897	9
13	832701	999990	832711	1167288	47	167298	9
14	833292	999989	833302	1166697	46	166707	10
15	833875	999989	833885	1166114	45	166124	10
16	834450	999989	834461	1165538	44	165549	10
17	835018	999989	835028	1164971	43	164981	10
18	835578	999988	835589	1164410	42	164421	11
19	836131	999988	836142	1163857	41	163868	11
20	836677	999988	836685	1163310	40	163322	11
21	837217	999987	837229	1162770	39	162782	12
22	837749	999987	837762	1162237	38	162250	12
23	838276	999987	838288	1161711	37	161723	12
24	838796	999987	838809	1161190	36	161203	12
25	839310	999986	839323	1160676	35	160689	13
26	839817	999986	839831	1160168	34	160182	13
27	840319	999986	840333	1159666	33	159680	13
28	840816	999985	840830	1159169	32	159183	14
29	841306	999985	841321	1158678	31	158693	14
30	841791	999985	841806	1158193	30	158208	14
	Sine Compl.	Sine.	Tangent Compl.	Tang	88	Secans.	Secans.

1	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	841791	999985	841806	1158193	30	158208	1000014
31	842271	999984	841286	1157713	29	157728	15
32	842746	999984	842761	1157238	28	157253	15
33	843215	999984	843231	1156768	27	156784	15
34	843679	999983	843696	1156303	26	156320	16
35	844139	999983	844156	1155843	25	155860	16
36	844594	999983	844611	1155388	24	155405	16
37	845044	999982	845061	1154938	23	154955	17
38	845489	999982	845506	1154493	22	154510	17
39	845930	999981	845948	1154051	21	154089	18
40	846366	999981	846384	1153615	20	153633	18
41	846798	999981	846817	1153182	19	153201	18
42	847226	999980	847245	1152754	18	152773	19
43	847649	999980	847669	1152330	17	152350	19
44	848069	999980	848089	1151910	16	151930	19
45	848484	999979	848505	1151494	15	151515	20
46	848896	999979	848916	1151083	14	151101	20
47	849303	999978	849325	1150674	13	150692	21
48	849707	999978	849729	1150270	12	150292	21
49	850107	999978	850129	1149870	11	149892	21
50	850504	999977	850526	1149473	10	149495	22
51	850897	999977	850920	1149079	9	149102	22
52	851286	999976	851309	1148690	8	148713	23
53	851672	999976	851696	1148303	7	148327	23
54	852055	999976	852079	1147920	6	147944	23
55	852434	999975	852458	1147541	5	147565	24
56	853810	999975	852834	1147165	4	147189	24
57	853182	999974	853207	1146792	3	146817	25
58	853552	999974	853577	1146422	2	146447	25
59	853918	999973	853944	1146095	1	146081	26
60	854281	999973	854308	1145691	0	145718	26
	Sine Compl.	Sine.	Tangent Compl.	Tang.	88	Secans.	Secans.

2	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Si. Co.
0	854281	999973	854308	1145691	60	145718	1000026
1	854642	999973	854669	1145330	59	145357	26
2	854999	999972	855026	1144973	58	145000	27
3	855353	999972	855381	1144618	57	144646	27
4	855705	999971	855733	1144266	56	144294	28
5	856054	999971	856082	1143917	55	143945	28
6	856399	999970	856429	1143570	54	143600	29
7	856743	999970	856772	1143227	53	143256	29
8	857083	999669	857113	1142886	52	142916	30
9	857421	999969	857451	1142548	51	142578	30
10	857756	999968	857787	1142212	50	142243	31
11	858089	999968	858120	1141879	49	141910	31
12	858419	999967	858451	1141548	48	141580	32
13	858746	999967	858779	1141220	47	141253	32
14	859072	999967	859105	1140894	46	140928	33
15	859394	999966	859428	1140571	45	140603	33
16	859715	999966	859749	1140250	44	140284	33
17	860033	999965	860067	1139932	43	139966	34
18	860348	999965	860383	1139616	42	139651	34
19	860662	999964	860697	1139302	41	139337	35
20	860973	999963	861009	1138990	40	139026	36
21	861282	999963	861318	1138681	39	138717	36
22	861589	999962	861626	1138373	38	138410	37
23	861893	999962	861931	1138068	37	138106	37
24	862196	999961	862234	1137765	36	137803	38
25	862496	999961	862535	1137464	35	137503	38
26	862794	999960	862834	1137165	34	137205	39
27	863091	999960	863130	1136869	33	136908	39
28	863385	999959	863428	1136574	32	136614	40
29	863677	999959	863716	1136281	31	136322	40
30	863967	999958	864009	1135990	30	136032	41
	Sine Compl.	Sine.	Tangent Compl.	Tang	87	Secans.	Secans.

2	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	863967	999958	864009	1135990	30	136032	1000041
31	864256	999958	864298	1135701	29	135743	41
32	864542	999957	864585	1135414	28	135457	42
33	864827	999956	864870	1135129	27	135172	43
34	865110	999956	865153	1134848	26	134889	43
35	865392	999955	865435	1134564	25	134608	44
36	865670	999955	865714	1134285	24	134329	44
37	865947	999954	865992	1134007	23	134052	45
38	866223	999954	866268	1133731	22	133776	45
39	866496	999953	866543	1133456	21	133503	46
40	866768	999952	866815	1133184	20	133231	47
41	867039	999952	867086	1132913	19	132960	47
42	867308	999951	867356	1132643	18	132691	48
43	867575	999951	867623	1132376	17	132424	48
44	867840	999950	867889	1132110	16	132159	49
45	868104	999949	868154	1131845	15	131895	50
46	868366	999949	868417	1131582	14	131633	50
47	868627	999948	868678	1131321	13	131372	51
48	868886	999948	868938	1131061	12	131113	51
49	869143	999947	869196	1130803	11	130856	52
50	869390	999946	869452	1130547	10	130600	53
51	869654	999946	869708	1130291	9	130345	53
52	869907	999945	869961	1130038	8	130092	54
53	870158	999944	870213	1129786	7	129841	55
54	870408	999944	870464	1129535	6	129591	55
55	870657	999943	870713	1129286	5	129342	56
56	870904	999943	870961	1129038	4	129095	56
57	871150	999942	871208	1128791	3	128849	57
58	871395	999941	871453	1128546	2	128604	58
59	871638	999941	871697	1128302	1	128361	58
60	871880	999940	871939	1128060	0	128119	59
	Sine Compl.	Sine.	Tangent Compl.	Tang.	87	Secans.	Secans.

3	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co
0	871880	999940	871939	1128060	60	128119	1000059
1	872120	999939	872180	1127819	59	127879	60
2	872359	999939	872420	1127579	58	127640	60
3	872597	999938	872658	1127341	57	127402	61
4	872833	999937	872895	1127104	56	127166	62
5	873068	999927	873131	1126868	55	126931	62
6	873302	999936	873366	1126633	54	126697	63
7	873535	999935	873599	1126400	53	126464	64
8	873766	999935	873831	1126168	52	126233	64
9	873996	999934	874062	1125937	51	126003	65
10	874225	999933	874292	1125707	50	125774	66
11	874453	999932	874520	1125479	49	125546	67
12	874680	999932	874747	1125252	48	125319	67
13	874905	999931	874974	1125026	47	125094	68
14	875129	999930	875198	1124801	46	124870	69
15	875352	999930	875422	1124577	45	124647	69
16	875574	999929	875645	1124354	44	124425	70
17	875795	999928	875866	1124133	43	124204	71
18	876015	999927	876087	1123912	42	123984	72
19	876233	999927	876306	1123693	41	123766	72
20	876451	999926	876524	1123475	40	123548	73
21	876667	999925	876741	1123258	39	123332	74
22	876882	999924	876957	1123042	38	123117	75
23	877096	999924	877172	1122827	37	122903	75
24	877310	999923	877386	1122613	36	122689	76
25	877522	999922	877599	1122400	35	122477	77
26	877733	999921	877811	1122188	34	122266	78
27	877943	999921	878022	1121977	33	122056	78
28	878152	999920	878231	1121768	32	121847	79
29	878360	999919	878440	1121559	31	121639	80
30	878567	999918	878648	1121351	30	121432	81
	Sine Compl.	Sine.	Tangent Compl.	Tang	86	Secans.	Secans.

3	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	878567	999918	878648	1121351	30	121432	1000081
31	878773	999918	878855	1121144	29	121226	81
32	878978	999917	879061	1120938	28	121021	82
33	879182	999916	879266	1120733	27	120817	83
34	879385	999915	879470	1120529	26	120614	84
35	879588	999915	879673	1120326	25	120411	84
36	879789	999914	879875	1120124	24	120210	85
37	879989	999913	880076	1119923	23	120010	86
38	880189	999912	880276	1119723	22	119810	87
39	880387	999911	880475	1119524	21	119612	88
40	880585	999911	880674	1119325	20	119414	88
41	880781	999910	880871	1119128	19	119218	89
42	880977	999909	881068	1118931	18	119022	90
43	881172	999908	881265	1118735	17	118827	91
44	881366	999907	881457	1118541	16	118633	92
45	882559	999906	881652	1118347	15	118440	93
46	881752	999906	881846	1118153	14	118247	93
47	881943	999905	882038	1117961	13	118056	94
48	882134	999904	882229	1117770	12	117865	95
49	882324	999903	882420	1117579	11	117675	96
50	882512	999902	882610	1117389	10	117487	97
51	882701	999901	882799	1117200	9	117298	98
52	882888	999901	882987	1117012	8	117111	98
53	883074	999900	883174	1116825	7	116925	99
54	883260	999899	883361	1116638	6	116739	100
55	883445	999898	883547	1116452	5	116552	101
56	883629	999897	883732	1116267	4	116370	102
57	883813	999896	883916	1116083	3	116186	103
58	883995	999895	884099	1115900	2	116004	104
59	884177	999894	884282	1115717	1	115822	105
60	884358	999894	884494	1115535	0	115641	105
	Sine Comp.	Sine.	Tangent Comp.	Tang	86	Secans.	Secans.

4	Sine	Sine Compl.	Tang	Tangent Compl.	Com. Ar. of Sine.	Com. Ar. of Si. Co.	
0	884358	999894	884464	1115535	60	115641	1000105
1	884358	999893	884645	1115354	59	115461	106
2	884718	999892	884825	1115174	58	115281	107
3	884897	999891	885005	1114994	57	115102	108
4	885075	999890	885184	1114815	56	114924	109
5	885252	999889	885362	1114637	55	114747	110
6	885429	999888	885540	1114459	54	114570	111
7	885604	999887	885717	1114282	53	114393	112
8	885780	999886	885893	1114106	52	114215	113
9	885954	999885	886068	1113931	51	114045	114
10	886128	999885	886243	1113756	50	113871	114
11	886301	999884	886417	1113582	49	113698	115
12	886473	999883	886590	1113409	48	113526	116
13	886645	999882	886763	1113236	47	113354	117
14	886816	999881	886935	1113064	46	113183	118
15	886986	999880	887106	1112893	45	113013	119
16	887156	999879	887276	1112723	44	112843	120
17	887325	999878	887446	1112553	43	112674	121
18	887493	999877	887616	1112383	42	112506	122
19	887661	999876	887784	1112215	41	112339	123
20	887828	999875	887952	1112107	40	112171	124
21	887994	999874	888120	1111879	39	112005	125
22	888160	999873	888289	1111713	38	111839	126
23	888325	999872	888453	1111546	37	111674	127
24	888490	999871	888618	1111381	36	111509	128
25	888654	999870	888782	1111216	35	111345	129
26	888817	999869	888947	1111052	34	111182	130
27	888980	999868	889111	1110888	33	111019	131
28	889142	999867	889274	1110725	32	110857	132
29	889303	999866	889436	1110563	31	110696	133
30	889464	999865	889598	1110401	30	110535	134
	Sine Compl.	Sine	Tangent Compl.	Tang	85	Secans.	Secans.

4	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar.	Com. Ar.
						of Sine.	of Sine Co.
30	889464	999865	889598	1110401	30	110535	1000134
31	889624	999864	889759	1110240	29	110375	135
32	889784	999863	889920	1110079	28	110215	136
33	889943	999862	890080	1109919	27	110056	137
34	890101	999861	890239	1109760	26	109898	138
35	890259	999860	890398	1109601	25	109740	139
36	890416	999859	890556	1109443	24	109583	140
37	890573	999858	890714	1109285	23	109426	141
38	890729	999857	890871	1109128	22	109270	142
39	890885	999856	891028	1108971	21	109114	143
40	891040	999855	891184	1108815	20	108959	144
41	891194	999854	891340	1108659	19	108805	145
42	891348	999853	891495	1108504	18	108651	146
43	891502	999852	891649	1108350	17	108497	147
44	891655	999851	891803	1108196	16	108344	148
45	891807	999850	891956	1108043	15	108192	149
46	891959	999849	892109	1107890	14	108040	150
47	892110	999848	892261	1107738	13	107889	151
48	892261	999847	892413	1107586	12	107738	152
49	892411	999846	892564	1107435	11	107588	153
50	892560	999845	892715	1107284	10	107439	154
51	892710	999844	892865	1107134	9	107289	155
52	892858	999843	893015	1106984	8	107141	156
53	893006	999842	893164	1106835	7	106993	157
54	893154	999840	893313	1106686	6	106845	159
55	893301	999839	893461	1106538	5	106698	160
56	893448	999838	893609	1106390	4	106551	161
57	893594	999837	893756	1106243	3	106405	162
58	893739	999836	893903	1106096	2	106260	163
59	893884	999835	894049	1105950	1	106115	164
60	894029	999834	894195	1105804	0	105970	165
	Sine Compl.	Sine.	Tangent Compl.	Tang 85	Secans.	Secans.	

Sine.	Sine Compl.	Tang	Tangent Compl.	Com. Ar of Sine.	Com. Ar of Si. Co.
0 894029	999834	894195	1105804	60 105970	1000165
1 894173	999833	894340	1105659	59 105826	166
2 894317	999832	894485	1105514	58 105682	167
3 894460	999831	894629	1105370	57 105539	168
4 894603	999829	894773	1105226	56 105396	170
5 894745	999828	894916	1105083	55 105254	171
6 894887	999827	895059	1104940	54 105112	172
7 895028	999826	895202	1104797	53 104971	173
8 895169	999825	895344	1104655	52 104830	174
9 895309	999824	895484	1104514	51 104690	175
10 895449	999823	895626	1104373	50 104550	176
11 895589	999822	895767	1104232	49 104410	177
12 895728	999820	895907	1104092	48 104271	179
13 895867	999819	896047	1103952	47 104132	180
14 896005	999818	896186	1103813	46 103994	181
15 896142	999817	896325	1103674	45 103857	182
16 896280	999816	896463	1103536	44 103719	183
17 896416	999815	896601	1103398	43 103583	184
18 896553	999813	896739	1103260	42 103446	186
19 896689	999812	896876	1103123	41 103310	187
20 896824	999811	897013	1102986	40 103175	188
21 896959	999810	897149	1102850	39 103040	189
22 897094	999809	897285	1102714	38 102905	190
23 897228	999808	897420	1102579	37 102771	191
24 897362	999806	897555	1102444	36 102637	193
25 897496	999805	897690	1102309	35 102503	194
26 897629	999804	897824	1102175	34 102370	195
27 897761	999803	897958	1102041	33 102238	196
28 897894	999802	898092	1101907	32 102105	197
29 898025	999800	898225	1101774	31 101974	199
30 898157	999799	898357	1101642	30 101842	200
Sine Compl.	Sine.	Tangent Compl.	Tang	84 Secans.	Secans.

Sine.	Sine Comp.	Tang	Tangent Compl.	Com. Ar. of Sine.	Com. Ar. of Sine Co.
30 808157	999799	898357	1101642	30 101842	1000200
31 898288	999798	898489	1101510	29 101711	201
32 898418	999797	898621	1101378	28 101581	202
33 898549	999795	898753	1101246	27 101450	204
34 898678	999794	898884	1101115	26 101321	205
35 898808	999793	899014	1100985	25 101191	206
36 898937	999792	899145	1100854	24 101062	207
37 899066	999790	899275	1100724	23 100933	209
38 899194	999789	899404	1100595	22 100805	210
39 899322	999788	899533	1100466	21 100677	211
40 899449	999787	899662	1100337	20 100550	212
41 899576	999785	899790	1100209	19 100423	214
42 899703	999784	899918	1100081	18 100296	215
43 899829	999783	900046	1099953	17 100170	216
44 899955	999782	900173	1099826	16 100044	217
45 900081	999780	900300	1099699	15 99918	219
46 900206	999779	900427	1099572	14 99793	220
47 900331	999778	900553	1099446	13 99668	221
48 900456	999777	900679	1099320	12 99543	222
49 900580	999775	900804	1099195	11 99419	224
50 900704	999774	900929	1099070	10 99295	225
51 900827	999773	901054	1098945	9 99172	226
52 900950	999771	901179	1098820	8 99049	228
53 901073	999770	901303	1098696	7 98926	229
54 901196	999769	901426	1098573	6 98803	230
55 901318	999768	901550	1098449	5 98681	231
56 901439	999766	901673	1098326	4 98560	233
57 901561	999765	901795	1098204	3 98438	234
58 901682	999764	901918	1098081	2 98317	235
59 901803	999762	902040	1097959	1 98196	237
60 901923	999761	902162	1097837	0 98076	238
Sine Compl.	Sine.	Tangent Compl.	Tang	84	

6	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	901923	999761	902162	1097837	60	98076	1000238
1	902043	999760	902283	1097716	59	97956	239
2	902163	999758	902404	1097595	58	97836	241
3	902282	999757	902525	1097474	57	97717	242
4	902401	999756	902645	1097354	56	97598	243
5	902520	999754	902765	1097234	55	97479	245
6	902638	999753	902885	1097114	54	97361	246
7	902756	999752	903004	1096995	53	97243	247
8	902874	999750	903123	1096876	52	97125	249
9	902991	999749	903242	1096757	51	97008	250
10	903108	999747	903360	1096639	50	96891	252
11	903225	999746	903479	1096520	49	96774	253
12	903342	999745	903596	1096403	48	96657	254
13	903458	999743	903714	1096285	47	96541	256
14	903574	999742	903831	1096168	46	96425	257
15	903689	999741	903948	1096051	45	96310	258
16	903804	999739	904065	1095934	44	96195	260
17	903919	999738	904181	1095818	43	96080	261
18	904034	999736	904297	1095702	42	95965	263
19	904148	999735	904412	1095587	41	95851	264
20	904262	999734	904528	1095471	40	95737	265
21	904376	999732	904643	1095356	39	95623	267
22	904489	999731	904758	1095227	38	95518	268
23	904602	999729	904872	1095113	37	95397	270
24	904715	999728	904986	1095084	36	95284	271
25	904827	999727	905100	1094899	35	95172	272
26	904940	999725	905214	1094785	34	95059	274
27	905051	999724	905327	1094672	33	94948	275
28	905163	999722	905440	1094559	32	94836	277
29	905274	999721	905553	1094446	31	94725	278
30	905385	999719	905665	1094334	30	94614	280
	Sine Compl.	Sine.	Tangent Compl.	Tang	83	Secans.	Secans.

Sine.	Sine Comp	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30 905385	999719	905665	1094334	30	94614	1000280
31 905496	999718	905778	1094221	29	94503	281
32 905607	999717	905890	1094109	28	94392	282
33 905717	999715	906001	1093998	27	94282	284
34 905827	999714	906112	1093887	26	94172	285
35 905936	999712	906224	1093775	25	94063	287
36 906046	999711	906334	1093665	24	93953	288
37 906155	999709	906445	1093554	23	93844	290
38 906263	999708	906555	1093444	22	93736	291
39 906372	999706	906665	1093334	21	93627	293
40 906480	999705	906775	1093224	20	93519	294
41 906588	999703	906884	1093115	19	93411	296
42 906696	999702	906993	1093006	18	93303	297
43 906803	999700	907102	1092897	17	93196	299
44 906910	999699	907211	1092788	16	93089	300
45 907017	999697	907319	1092680	15	92982	302
46 907124	999696	907427	1092572	14	92875	303
47 907230	999694	907535	1092464	13	92769	305
48 907336	999693	907643	1092356	12	92663	306
49 907442	999691	907750	1092249	11	92557	308
50 907547	999690	907857	1092142	10	92452	309
51 907653	999688	907964	1092035	9	92346	311
52 907758	999687	908070	1091929	8	92241	312
53 907863	999685	908177	1091822	7	92136	314
54 907967	999684	908283	1091716	6	92032	315
55 908071	999682	908389	1091610	5	91928	317
56 908175	999681	908494	1091505	4	91824	318
57 908279	999679	908599	1091400	3	91720	320
58 908383	999678	908705	1091294	2	91616	321
59 908486	999676	908809	1091190	1	91512	323
60 908580	999675	908914	1091085	0	91410	324
Sine Compl.	Sine.	Tangent Compl.	Tang	83	Secans.	Secans.

	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	908589	999675	908914	1091085	60	1410	1000324
1	908692	999673	909018	1090981	59	91307	326
2	908794	999671	909122	1090877	58	91205	328
3	908897	999670	909226	1090773	57	91103	329
4	908999	999668	909330	1090669	56	91000	331
5	909100	999667	909433	1090566	55	90899	332
6	909202	999665	909536	1090463	54	90797	334
7	909303	999664	909639	1090360	53	90696	335
8	909404	999662	909742	1090257	52	90595	337
9	909505	999660	909844	1090155	51	90494	339
10	909606	999659	909946	1090053	50	90393	340
11	909706	999657	910048	1089951	49	90293	342
12	909806	999656	910150	1089849	48	90193	343
13	909906	999654	910251	1089748	47	90093	345
14	910006	999652	910353	1089646	46	89993	347
15	910105	999651	910454	1089545	45	89894	348
16	910204	999649	910555	1089445	44	89795	350
17	910303	999648	910655	1089344	43	89696	351
18	910402	999646	910755	1089244	42	89597	353
19	910500	999644	910856	1089143	41	89499	355
20	910590	999643	910955	1089044	40	89400	356
21	910697	999641	911055	1088944	39	89302	358
22	910795	999640	911155	1088844	38	89204	359
23	910892	999638	911254	1088745	37	89107	361
24	910990	999636	911353	1088646	36	89009	363
25	911087	999635	911452	1088547	35	88912	364
26	911184	999633	911550	1088449	34	88815	366
27	911280	999631	911649	1088350	33	88719	368
28	911377	999630	911747	1088252	32	88622	369
29	911473	999628	911845	1088154	31	88526	371
30	911569	999626	911942	1088057	30	88430	373
	Sine Compl.	Sine.	Tangent Compl.	Tang	82		

7	Sine.	Sine Compl.	Tang	Tangent Compl.		Com.Ar. of Sine.	Com. Ar. of Si. Co.
30	911569	999626	911942	1088057	30	88430	1000373
31	911665	999625	912040	1087959	29	88334	374
32	911761	999623	912137	1087862	28	88238	376
33	911856	999621	912234	1087765	27	88143	378
34	911951	999620	912331	1087668	26	88048	379
35	912046	999618	912428	1087571	25	87952	381
36	912141	999616	912524	1087475	24	87858	383
37	912236	999615	912621	1087378	23	87763	384
38	912330	999613	912717	1087282	22	87669	386
39	912424	999611	912813	1087186	21	87575	388
40	912518	999610	912908	1087091	20	87481	389
41	912612	999608	913004	1086995	19	87387	391
42	912706	999606	912099	1086900	18	87294	393
43	912799	999604	913194	1086805	17	87200	395
44	912892	999603	913289	1086710	16	87107	396
45	912985	999601	913383	1086616	15	87014	398
46	913078	999599	913478	1086521	14	86921	400
47	913170	999598	913572	1086427	13	86829	401
48	913262	999596	913666	1086333	12	86737	403
49	913355	999594	913760	1086239	11	86644	405
50	913447	999592	913854	1086145	10	86552	407
51	913538	999591	913947	1086052	9	86461	408
52	913630	999589	914040	1085959	8	86369	410
53	913721	999587	914134	1085865	7	86278	412
54	913812	999585	914226	1085773	6	86187	414
55	913903	999584	914319	1085680	5	86096	415
56	913994	999582	914412	1085587	4	86005	417
57	914085	999580	914504	1085495	3	85914	419
58	914175	999578	914596	1085403	2	85824	421
59	914265	999577	914688	1085311	1	85734	422
60	914355	999575	914780	1085219	0	85644	424
	Sine Compl.	Sine.	Tangent Compl.	Tang	82		

8	Sine.	Sine Compl.	Tang	Tangent Compl.	Com.Ar. of Sine.	Com. Ar. of Si. Co.
0	914355	999575	914780	1085210	60	85644 1000424
1	914445	999573	914871	1085128	59	85554 426
2	914534	999571	914963	1085036	58	85465 428
3	914624	999569	915054	1084945	57	85375 430
4	914713	999568	915145	1084854	56	85286 431
5	914802	999566	915236	1084763	55	85197 433
6	914891	999564	915326	1084673	54	85108 435
7	914980	999562	915417	1084582	53	85019 437
8	915068	999560	915507	1084492	52	84931 439
9	915156	999559	915597	1084402	51	84843 440
10	915245	999557	915687	1084312	50	84754 442
11	915333	999555	915777	1084222	49	84666 444
12	915420	999553	915867	1084132	48	84579 446
13	915508	999551	915956	1084043	47	84491 448
14	915595	999550	916045	1083954	46	84404 440
15	915682	999548	916134	1083865	45	84317 451
16	915770	999546	916223	1083776	44	84230 453
17	915856	999544	916312	1083687	43	84143 455
18	915943	999542	916400	1083599	42	84056 457
19	916030	999540	916489	1083510	41	83969 459
20	916116	999539	916577	1083422	40	83883 460
21	916202	999537	916665	1083334	39	83797 462
22	916288	999535	916753	1083246	38	83711 464
23	916374	999533	916849	1083159	37	83625 466
24	916459	999531	916928	1083071	36	83540 468
25	916545	999529	917015	1082984	35	83454 470
26	916630	999527	917102	1082897	34	83369 472
27	916715	999525	917189	1082810	33	83284 474
28	916800	999524	917276	1082723	32	83199 475
29	916885	999522	917363	1082636	31	83114 477
30	916970	999520	917449	1082550	30	83029 479
	Sine Compl.	Sine.	Tangent Compl.	Tang	81	Secans. Secans.

8	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	916970	999520	917449	1082550	30	83029	1000479
31	917054	999518	917536	1082463	29	82945	481
32	917138	999516	917622	1082377	28	82861	483
33	917223	999514	917708	1082291	27	82776	485
34	917306	999512	917794	1082205	26	82693	487
35	917390	999510	917879	1082120	25	82609	489
36	917474	999508	917965	1082024	24	82535	491
37	917557	999507	918050	1081949	23	82442	492
38	917641	999505	918136	1081853	22	82368	494
39	917724	999503	918221	1081778	21	82275	496
40	917807	999501	918305	1081694	20	82192	498
41	917890	999499	918390	1081609	19	82109	500
42	917972	999497	918475	1081524	18	82027	502
43	918055	999495	918559	1081440	17	81944	504
44	918137	999493	918643	1081356	16	81862	506
45	918219	999491	918728	1081271	15	81780	508
46	918301	999489	918811	1081188	14	81698	510
47	918383	999487	918895	1081104	13	81616	512
48	918465	999485	918979	1081020	12	81534	514
49	918546	999483	919062	1080937	11	81453	516
50	918628	999481	919146	1080853	10	81371	518
51	918709	999479	919229	1080770	9	81290	520
52	918790	999477	919312	1080687	8	81209	522
53	918871	999475	919395	1080604	7	81128	524
54	918951	999473	919478	1080521	6	81048	526
55	919032	999471	919560	1080439	5	80967	528
56	919112	999469	919643	1080356	4	80887	530
57	919193	999467	919725	1080274	3	80806	532
58	919273	999465	919807	1080192	2	80726	534
59	919353	999463	919889	1080110	1	80646	536
60	919433	999461	919971	1080028	0	80566	538
	Sine Compl.	Sine.	Tangent Compl.	Tang.	81	Secans.	Secans.

9	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of St Co.
0	919433	999461	919971	1080028	60	80566	1000538
1	919512	999459	920052	1079947	59	80487	540
2	919592	999457	920134	1079865	58	80407	542
3	919671	999455	920215	1079784	57	80328	544
4	919751	999453	920297	1079702	56	80248	546
5	919830	999451	920378	1079621	55	80169	548
6	919909	999449	920459	1079540	54	80090	550
7	919987	999447	920540	1079459	53	80012	552
8	920066	999445	920620	1079379	52	79933	554
9	920145	999443	920701	1079298	51	79854	556
10	920223	999441	920781	1079218	50	79776	558
11	920301	999439	920861	1078186	49	79686	560
12	920379	999437	920942	1078057	48	79620	562
13	920457	999435	921022	1078978	47	79542	564
14	920535	999433	921101	1078898	46	79464	566
15	920613	999431	921181	1078818	45	79386	568
16	920690	999429	921261	1078738	54	79309	570
17	920767	999427	921340	1078659	43	79232	572
18	920845	999425	921419	1078580	42	79124	574
19	920922	999423	921498	1078501	41	79077	576
20	920999	999421	921577	1078422	40	79000	578
21	921075	999419	921656	1078343	39	78924	580
22	921152	999417	921735	1078264	38	78847	582
23	921229	999414	921814	1078185	37	78770	585
24	921305	999412	921892	1078107	36	78694	587
25	921381	999410	921970	1078029	35	78618	589
26	921457	999408	922049	1077950	34	78542	591
27	921533	999406	922127	1077872	33	78466	593
28	921609	999404	922205	1077794	32	78390	595
29	921685	999402	922282	1077717	31	78314	597
30	921760	999400	922360	1077639	30	78239	599
	Sine Compl.	Sine.	Tangent Compl.	Tang	80		

Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30 921760	999400	922360	1077639	30	78239	1000599
31 921836	999398	922438	1077561	29	78163	601
32 921911	999396	922515	1077484	28	78088	603
33 921988	999393	922592	1077407	27	78013	606
34 922061	999391	922670	1077329	26	77938	608
35 922136	999389	922747	1077252	25	77863	610
36 922211	999387	922823	1077176	24	77788	612
37 922286	999385	922900	1077099	23	77713	614
38 922360	999383	922977	1077022	22	77639	616
39 922434	999381	923053	1076946	21	77565	618
40 922509	999378	923130	1076869	20	77490	621
41 922583	999376	923206	1076793	19	77416	623
42 922657	999374	923282	1076717	18	77342	625
43 922731	999372	923358	1076641	17	77268	627
44 922804	999370	923434	1076565	16	77193	629
45 922878	999368	923510	1076489	15	77121	631
46 922951	999365	923585	1076414	14	77048	634
47 923025	999363	923661	1076338	13	76974	636
48 923098	999361	923736	1076263	12	76901	638
49 923171	999359	923812	1076187	11	76828	640
50 923244	999357	923887	1076112	10	76755	642
51 923317	999355	923962	1076037	9	76682	644
52 923389	999352	924037	1075962	8	76610	647
53 923462	999350	924111	1075888	7	76537	649
54 923534	999348	924186	1075813	6	76465	651
55 923607	999346	924261	1075738	5	76392	653
56 923679	999344	924335	1075664	4	76320	655
57 923751	999341	924409	1075590	3	76248	658
58 923823	999339	924483	1075516	2	76176	660
59 923895	999337	924557	1075442	1	76104	662
60 923967	999335	924631	1075368	0	76032	664
Sine Compl.	Sine.	Tangent Compl.	Tang.	80		

10	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	923967	999335	924631	1075368	60	76032	1000664
1	924038	999332	924705	1075294	59	75961	667
2	924110	999330	924779	1075220	58	75889	669
3	924181	999328	924852	1075147	57	75818	671
4	924252	999326	924926	1075073	56	75747	673
5	924323	999323	924999	1075000	55	75676	676
6	924394	999321	925073	1074926	54	75605	678
7	924465	999319	925146	1074853	53	75534	680
8	924536	999317	925219	1074780	52	75463	682
9	924606	999314	925292	1074708	51	75393	685
10	924677	999312	925364	1074635	50	75322	687
11	924747	999310	925437	1074562	49	75252	689
12	924818	999308	925509	1074490	48	75181	691
13	924888	999305	925582	1074417	47	75111	694
14	924958	999303	925654	1074345	46	75041	696
15	925028	999301	925726	1074273	45	74971	698
16	925098	999299	925799	1074200	44	74901	700
17	925167	999296	925870	1074129	43	74832	703
18	925237	999294	925942	1074057	42	74762	705
19	925306	999292	926014	1073985	41	74693	707
20	925376	999289	926086	1073913	40	74623	710
21	925445	999287	926157	1073842	39	74554	712
22	925514	999285	926229	1073770	38	74485	714
23	925583	999282	926300	1073699	37	74416	717
24	925652	999280	926371	1073628	36	74347	719
25	925721	999278	926442	1073557	35	74278	721
26	925789	999275	926513	1073486	34	74210	724
27	925858	999273	926584	1073415	33	74141	726
28	925926	999271	926655	1073344	32	74073	728
29	925995	999268	926726	1073273	31	74004	731
30	926063	999266	926796	1073203	30	73936	733
	Sine Comp.	Sine.	Tangent Comp.	Tang	79	Sec ans.	Secans.

10	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Si. Co.
30	926063	999266	926796	1073203	20	73936	1000733
31	926131	999264	926867	1073132	29	73868	735
32	926199	999261	926937	1073062	28	73800	738
33	926267	999259	927007	1072992	27	73732	740
34	926335	999257	927077	1072922	26	73664	742
35	926402	999254	927147	1072852	25	73597	745
36	926470	999252	927217	1072782	24	73529	747
37	926537	999250	927287	1072712	23	73462	749
38	926605	999247	927357	1072642	22	73394	752
39	926672	999245	927426	1072573	21	73327	754
40	926739	999243	927496	1072503	20	73260	756
41	926806	999240	927565	1072434	19	73193	759
42	926873	999238	927635	1072364	18	73126	761
43	926940	999235	927704	1072295	17	73059	764
44	927006	999233	927773	1072226	16	72993	766
45	927073	999231	927842	1072157	15	72926	768
46	927139	999228	927911	1072088	14	72860	771
47	927206	999226	927980	1072019	13	72793	773
48	927272	999223	928048	1071951	12	72727	776
49	927338	999221	928117	1071882	11	72661	778
50	927404	999219	928185	1071814	10	72595	780
51	927470	999216	928254	1071745	9	72529	783
52	927536	999214	928322	1071677	8	72463	785
53	927602	999211	928390	1071609	7	72397	788
54	927668	999209	928458	1071541	6	72331	790
55	927733	999206	928526	1071473	5	72266	793
56	927799	999204	928594	1071405	4	72200	795
57	927864	999202	928662	1071337	3	72135	797
58	927929	999199	928730	1071269	2	72070	800
59	927994	999197	928797	1071202	1	72005	802
60	928059	999194	928865	1071134	0	71940	805
	Sine Compl.	Sine.	Tangent Compl.	Tang	79	Secans.	Secans.

I	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	928059	999194	928865	1071134	60	71940	1000805
1	928124	999192	928932	1071067	59	71810	807
2	928189	999189	928999	1071000	58	71875	810
3	928254	999187	929067	1070932	57	71745	812
4	928319	999184	929134	1070865	56	71680	815
5	928383	999182	929201	1070798	55	71616	817
6	928448	999179	929268	1070731	54	71551	820
7	928512	999177	929335	1070665	53	71484	822
8	928576	999174	929401	1070598	52	71423	825
9	928640	999172	929468	1070531	51	71359	827
10	928704	999169	929534	1070465	50	71295	830
11	928768	999167	929601	1070398	49	71231	832
12	928832	999164	929667	1070332	48	71167	835
13	928896	999162	929733	1070266	47	71103	837
14	928960	999159	929800	1070199	46	71039	840
15	929023	999157	929866	1070133	45	70976	842
16	929087	999154	929932	1070067	44	70912	845
17	929150	999152	929998	1070001	43	70849	847
18	929213	999149	930063	1069936	42	70786	850
19	929276	999147	930129	1069870	41	70723	852
20	929339	999144	930195	1069804	40	70660	855
21	929402	999142	930260	1069739	39	70597	857
22	929465	999139	930326	1069673	38	70534	860
23	929528	999137	930391	1069608	37	70473	862
24	929591	999134	930456	1069543	36	70408	865
25	929653	999132	930521	1069478	35	70346	867
26	929716	999129	930586	1069413	34	70283	870
27	929778	999126	930651	1069348	33	70221	873
28	929841	999124	930716	1069283	32	70158	875
29	929903	999121	930781	1069218	31	70096	878
30	929965	999119	930846	1069153	30	70034	880
	Sine Comp.	Sine.	Tangent Comp.	Tang	78		

II	Sine.	Sine Compl.	Tang	Tangens Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	929965	999119	930846	1069153	30	70034	1000880
31	930027	999116	930910	1069089	29	69972	883
32	930089	999114	930975	1069024	28	69910	885
33	930151	999111	931039	1068960	27	69848	888
34	930213	999108	931104	1068895	26	69786	891
35	930274	999106	931168	1068831	25	69725	893
36	930336	999103	931232	1068767	24	69663	896
35	930397	999101	931296	1068703	23	69602	898
38	930459	999098	931360	1068639	22	69540	901
39	930520	999095	931424	1068575	21	69479	904
40	930581	999093	931488	1068511	20	69418	906
41	930643	999090	931552	1068447	19	69356	909
42	930704	999088	931615	1068384	18	69295	911
43	930765	999085	931679	1068320	17	69234	914
44	930825	999082	931742	1068257	16	69174	917
45	930886	999080	931806	1068193	15	69113	919
46	930947	999077	931869	1068130	14	68052	922
47	931007	999075	931932	1068067	13	68992	924
48	931068	999072	931996	1068003	12	68931	927
49	931128	999069	932059	1067947	11	68871	930
50	931184	999067	932122	1067877	10	68810	932
51	931249	999064	932185	1067814	9	68750	935
52	931309	999061	932247	1067752	8	68690	938
53	931369	999059	932310	1067689	7	68630	940
54	931429	999056	932373	1067626	6	68570	943
55	931489	999053	932435	1067567	5	68510	946
56	931549	999051	932498	1067501	4	68450	948
57	931609	999048	932560	1067439	3	68390	951
58	931668	999045	932626	1067376	2	68331	954
59	931728	999043	932685	1067314	1	68271	956
60	931787	999040	932747	1067252	0	68212	959
	Sine Compl.	Sine.	Tangent Compl.	Tang	78		

1 2	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	931787	999040	932747	1067252	60	68212	1000959
1	931847	999037	932809	1067190	59	68152	962
2	931906	999035	932871	1067128	58	68093	964
3	931965	999032	932933	1067066	57	68034	967
4	932024	999029	932995	1067004	56	67975	970
5	932084	999026	933057	1066942	55	67916	973
6	932142	999024	933118	1066881	54	67857	975
7	932201	999021	933180	1066819	53	67798	978
8	932260	999018	933241	1066758	52	67739	981
9	932319	999016	933303	1066696	51	67680	983
10	932378	999013	933364	1066635	50	67621	986
11	932436	999010	933425	1066574	49	67563	989
12	932495	999007	933487	1066512	48	67504	992
13	932553	999005	933548	1066451	47	67446	994
14	932611	999002	933609	1066390	46	67388	997
15	932669	998999	933670	1066329	45	67330	1000
16	932728	998996	933731	1066268	44	67271	1003
17	932786	998994	933791	1066208	43	67213	1005
18	932844	998991	933852	1066147	42	67155	1008
19	932902	998988	933913	1066086	41	67097	1011
20	932959	998985	933973	1066026	40	67040	1014
21	933017	998983	934034	1065965	39	66982	1016
22	933075	998980	934094	1065905	38	66924	1019
23	933132	998977	934155	1065844	37	66867	1022
24	933190	998975	934215	1065784	36	66809	1025
25	933247	998972	934275	1065724	35	66752	1027
26	933305	998969	934335	1065664	34	66694	1030
27	933362	998966	934395	1065604	33	66637	1033
28	933419	998963	934455	1065544	32	66580	1036
29	933476	998960	934515	1065484	31	66523	1039
30	933533	998958	934571	1065424	30	66466	1041
	Sine Compl.	Sine.	Tangent Compl.	Tang.	77	Secans.	Secans.

12	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	933533	998958	934575	1065424	30	66466	10001041
31	933590	998955	934635	1065364	29	66409	1044
32	933647	998952	934694	1065305	28	66352	1047
33	933704	998949	934754	1065245	27	66295	1050
34	933760	998946	934814	1065185	26	66239	1153
35	933817	998944	934873	1065126	25	66182	1055
36	933874	998941	934932	1065067	24	66125	1058
37	933930	998938	934992	1065007	23	66069	1061
38	933987	998935	935051	1064948	22	66012	1064
39	934043	998932	935110	1064889	21	65956	1067
40	934099	998929	935169	1064830	20	65900	1070
41	934155	998927	935228	1064771	19	65844	1072
42	934211	998924	935287	1064712	18	65788	1075
43	934267	998921	935346	1064653	17	65732	1078
44	934323	998918	935405	1064594	16	65676	1081
45	934379	998915	935464	1064535	15	65620	1084
46	934435	998912	935522	1064477	14	65564	1087
47	934491	998909	935581	1064418	13	65508	1090
48	934546	998907	935639	1064360	12	65453	1092
49	934602	998904	935698	1064301	11	65397	1095
50	934657	998901	935756	1064243	10	65342	1098
51	934713	998898	935814	1064185	9	65286	1101
52	934768	998895	935873	1064126	8	65231	1104
53	934823	998892	935931	1064068	7	65176	1107
54	934879	998889	935989	1064010	6	65120	1112
55	934934	998886	936047	1063952	5	65065	1113
56	934989	998884	936105	1063894	4	65010	1115
57	935044	998881	936163	1063836	3	64955	1118
58	935099	998878	936221	1063779	2	64900	1121
59	935154	998875	936278	1063721	1	64845	1124
60	935208	998872	936336	1063663	0	64791	1127
	Sine Compl.	Sine.	Tangent Compl.	Tang	77	Secans.	Secans.

13	Sine.	Sine Compl.	Tang	Tangent Compl.	Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	935208	998872	936336	1063663	60	64791 1001127
1	935263	998869	936394	1063605	59	64736 1130
2	935318	998866	936451	1063548	58	64681 1133
3	935372	998863	936509	1063490	57	64627 1136
4	935427	998860	936566	1063433	56	64572 1139
5	935481	998857	936623	1063376	55	64518 1142
6	935535	998854	936681	1063319	54	64464 1145
7	935590	998851	936738	1063261	53	64409 1148
8	935644	998848	936795	1063204	52	64355 1151
9	935698	998845	936852	1063147	51	64301 1154
10	935752	998843	936909	1063090	50	64247 1156
11	935806	998840	936966	1063033	49	64193 1159
12	935860	998837	937023	1062976	48	64139 1162
13	935914	998834	937079	1062920	47	64085 1165
14	935967	998831	937136	1062863	46	64032 1168
15	936021	998828	937193	1062806	45	63978 1167
16	936075	998825	937249	1062750	44	63924 1174
17	936128	998822	937306	1062693	43	63861 1177
18	936182	998819	937362	1062637	42	63817 1180
19	936235	998816	937419	1062580	41	63764 1183
20	936288	998813	937475	1062524	40	63711 1186
21	936342	998810	937531	1062468	39	63657 1189
22	936395	998807	937588	1062411	38	63604 1192
23	936448	998804	937644	1062355	37	63551 1195
24	936501	998801	937700	1062299	36	63498 1198
25	936554	998798	937756	1062240	35	63445 1201
26	936607	998795	937812	1062187	34	63392 1204
27	936660	998792	937868	1062131	33	63339 1207
28	936713	998789	937923	1062076	32	63286 1210
29	936765	998786	937979	1062020	31	63234 1213
30	936818	998783	938035	1061964	30	63181 1216
	Sine Compl.	Sine.	Tangent Compl.	Tang.	76	

13	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	936818	998783	938035	1061964	30	63181	1001216
31	936871	998780	938091	1061909	29	63128	1219
32	936923	998777	938146	1061853	28	63076	1222
33	936976	998774	938202	1061797	27	63023	1225
34	937028	998770	938257	1061742	26	62971	1229
35	937080	998767	938312	1061687	25	62919	1232
36	937133	998764	938368	1061631	24	62866	1235
37	937185	998761	938423	1061576	23	62814	1238
38	937237	998758	938478	1061521	22	62762	1241
39	937289	998755	938533	1061466	21	62710	1244
40	937341	998752	938588	1061411	20	62658	1247
41	937393	998749	938643	1061356	19	62606	1250
42	937445	998746	938698	1061301	18	62554	1253
43	937496	998743	938753	1061246	17	62503	1256
44	937548	998740	938808	1061191	16	62452	1259
45	937600	998737	938863	1061136	15	62399	1262
46	937651	998734	938917	1061082	14	62348	1265
47	937703	998731	938972	1061027	13	62296	1268
48	937754	998727	939027	1060973	12	62245	1272
49	937806	998724	939081	1060918	11	62193	1275
50	937857	998721	939135	1060864	10	62142	1278
51	937908	998718	939190	1060809	9	62091	1281
52	937960	998715	939244	1060755	8	62039	1284
53	938011	998712	939298	1060701	7	61988	1287
54	938062	998709	939355	1060644	6	61937	1290
55	938113	998706	939407	1060592	5	61886	1293
56	938164	998702	939461	1060538	4	61835	1297
57	938215	998699	939515	1060484	3	61784	1300
58	938266	998696	939569	1060430	2	61733	1303
59	938316	998693	939623	1060376	1	61683	1306
60	938367	998690	939677	1060322	0	61632	1309
	Sine Compl.	Sine.	Tangent Compl.	Tang	76	Secans.	Secans.

14	Sine.	Sine Comp.	Tang	Tangent Compl.]		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	938367	998690	939673	1060322	60	61632	1001309
1	938418	998687	939730	1060269	59	61581	1312
2	938468	998684	939784	1060215	58	61531	1315
3	938519	998680	939838	1060161	57	61480	1319
4	938569	998677	939891	1060108	56	61480	1322
5	938620	998674	939945	1060054	55	61379	1325
6	938670	998671	939998	1060001	54	61229	1328
7	938720	998668	940052	1059947	53	61279	1331
8	938770	998665	940105	1059894	52	61229	1334
9	938821	998661	940159	1059840	51	61178	1338
10	938871	998658	940212	1059787	50	61128	1341
11	938921	998655	940265	1059734	49	61078	1344
12	938971	998652	940318	1059681	48	61028	1347
13	939020	998649	940371	1059628	47	60979	1350
14	939070	998645	940424	1059575	46	60929	1354
15	939120	998642	940477	1059522	45	60879	1357
16	939170	998639	940530	1059469	44	60829	1360
17	939219	998636	940583	1059416	43	60780	1363
18	939269	998633	940636	1059363	42	60730	1366
19	939319	998629	940689	1059310	41	60680	1370
20	939368	998626	940741	1059258	40	60631	1373
21	939417	998623	940794	1059201	39	60582	1376
22	939467	998620	940847	1059152	38	60532	1379
23	939516	998616	940899	1059100	37	60483	1383
24	939565	998613	940952	1059047	36	60434	1386
25	939614	998610	941004	1058995	35	60385	1389
26	939664	998607	941056	1058943	34	60335	1392
27	939713	998603	941109	1058890	33	60289	1396
28	939762	998600	941161	1058838	32	60237	1399
29	939811	998597	941213	1058786	31	60188	1402
30	939859	998594	941265	1058734	30	60140	1405
	Sine Compl.	Sine.	Tangent Compl.	Tang	75	Secans.	Secans.

14	Sine.	Sine Comp	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
20	939859	998594	941265	1058734	30	60140	1001405
31	939908	998590	941317	1058682	29	60091	1409
32	939957	998587	941369	1058630	28	60042	1412
33	940006	998584	941421	1058578	27	59993	1415
34	940054	998581	941473	1058526	26	59945	1418
35	940103	998577	941525	1058474	25	59896	1422
36	940152	998574	941577	1058422	24	59847	1425
37	940200	998571	941629	1058370	23	59799	1428
38	930248	998567	941680	1058319	22	59751	1432
39	940297	998564	941732	1058267	21	59702	1435
40	940345	998561	941784	1058215	20	59654	1438
41	940393	998557	941835	1058164	19	59606	1442
42	940441	998554	941887	1058112	18	59558	1445
43	940490	998551	941938	1058061	17	59509	1448
44	940538	998548	941990	1058009	16	59461	1451
45	940586	998544	942041	1057958	15	59413	1455
46	940634	998541	942092	1057907	14	59365	1458
47	940682	998538	942143	1057856	13	59317	1461
48	940729	998534	942195	1057804	12	59270	1465
49	940777	998531	942246	1057753	11	59222	1468
50	940825	998528	942297	1057702	10	59174	1471
51	940873	998524	942348	1057651	9	59126	1475
52	940920	998521	942399	1057600	8	59079	1478
53	940968	998517	942450	1057549	7	59031	1482
54	941015	998514	942501	1057498	6	58984	1485
55	941063	998511	942551	1057448	5	58936	1488
56	941110	998507	942602	1057397	4	58889	1492
57	941157	998504	942653	1057346	3	58842	1495
58	941205	998501	942704	1057295	2	58794	1498
59	941252	998497	942754	1057235	1	58747	1502
60	941299	998494	942805	1057194	0	58700	1505
	Sine Compl.	Sine.	Tangent Compl.	Tang	75	Secans.	Secans.

15	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	941299	998494	942805	1057194	60	58700	1001505
1	941346	998490	942895	1057144	59	58653	1509
2	941393	998487	942906	1057093	58	58606	1512
3	941440	998484	942956	1057043	57	58559	1515
4	941487	998480	943006	1056993	56	58512	1519
5	941534	998477	943057	1056942	55	58465	1522
6	941581	998474	943107	1066892	54	58418	1526
7	941628	998470	943157	1056842	53	58371	1529
8	941675	998467	943207	1056792	52	58324	1532
9	941721	998463	943257	1056742	51	58278	1536
10	941768	998460	943308	1056691	50	58231	1539
11	941814	998450	943358	1056641	49	58185	1543
12	941861	998453	943408	1056592	48	58138	1546
13	941907	998450	943457	1056542	47	58092	1549
14	941954	998446	943507	1056492	46	58045	1553
15	942000	998443	943557	1056442	45	57999	1556
16	942047	998439	943607	1056392	44	57952	1560
17	942093	998436	943657	1056342	43	57906	1563
18	942139	998432	943706	1056293	42	57860	1567
19	942185	998429	943756	1056243	41	57814	1570
20	942231	998425	943805	1056194	40	57768	1574
21	942277	998422	943855	1056144	39	57722	1577
22	942323	998418	943904	1056095	38	57676	1581
23	942369	998415	943954	1056045	37	57630	1584
24	942415	998412	944003	1055996	36	57584	1588
25	942461	998408	944052	1055947	35	57538	1591
26	942507	998405	944102	1055897	34	57492	1594
27	942552	998401	944151	1055848	33	57447	1598
28	942598	998398	944200	1055799	32	57401	1601
29	942644	998394	944249	1055750	31	57355	1605
30	942689	998391	944298	1055701	30	57310	1608
	Sine Compl.	Sine.	Tangent Compl.	Tang	74	Secans.	Secans.

Ar. Co.	Sine.	Sine Compl.	Tang	Tangent Compl.	Com. Ar. of Sine.	Com. Ar. of Sine Co.
15	30 942689	998391	944298	1055701	30 57310	1001608
09	31 942735	998387	944347	1055652	29 57264	1612
12	32 942780	998384	944396	1055603	28 57219	1615
15	33 942826	998380	944445	1055554	27 57173	1619
19	34 942871	998377	944494	1055505	26 57128	1622
22	35 942917	998373	944543	1055456	25 57082	1626
26	36 942962	998369	944592	1055407	24 57037	1630
29	37 943007	998366	944641	1055358	23 56992	1633
32	38 943052	998362	944689	1055310	22 56947	1637
36	39 943097	998359	944738	1055261	21 56902	1640
39	40 943142	998355	944787	1055212	20 56857	1644
43	41 943187	998352	944835	1055164	19 56812	1647
46	42 943232	998348	944884	1055115	18 56767	1651
49	43 943277	998345	944932	1055067	17 56722	1654
53	44 943322	998341	944981	1055018	16 56677	1658
56	45 943367	998338	945029	1054970	15 56632	1661
60	46 943412	998334	945077	1054922	14 56587	1665
63	47 943456	998330	945126	1054873	13 56543	1669
67	48 943501	998327	945174	1054825	12 56498	1672
70	49 943546	998323	945222	1054777	11 56453	1676
74	50 943590	998320	945270	1054729	10 56409	1679
77	51 943635	998316	945318	1054681	9 56364	1683
81	52 943679	998313	945366	1054633	8 56320	1686
84	53 943724	998309	945414	1054585	7 56275	1690
88	54 943768	998305	945462	1054537	6 56231	1694
91	55 943812	998302	945510	1054489	5 56187	1697
94	56 943857	998298	945558	1054441	4 56142	1701
98	57 943901	998295	945606	1054393	3 56098	1702
01	58 943945	998291	945654	1054345	2 56054	1708
05	59 943989	998287	945701	1054298	1 56010	1712
08	60 944033	998284	945749	1054250	0 55966	1715
	Sine Compl.	Sine.	Tangent Compl.	Tang	Secans.	Secans.

16	Sine.	Sine Compl.	1 ang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Si. Co.
0	944033	998284	945749	1054250	60	55966	10001715
1	944077	998280	945797	1054202	59	55922	1719
2	944121	998276	945844	1054155	58	55878	1723
3	944165	998273	945892	1054107	57	55834	1726
4	944209	998269	945940	1054059	56	55790	1730
5	944252	998266	945987	1054012	55	55746	1734
6	944297	998262	946034	1053965	54	55702	1737
7	944341	998258	946082	1053917	53	55658	1741
8	944384	998255	946129	1053870	52	55615	1744
9	944428	998251	946176	1053823	51	55571	1748
10	944471	998247	946224	1053775	50	55528	1752
11	944515	998244	946271	1053728	49	55484	1755
12	944559	998240	946318	1053681	48	55440	1759
13	944602	998236	946365	1053634	47	55397	1763
14	944645	998233	946412	1053587	46	55354	1766
15	944689	998229	946459	1053540	45	55310	1770
16	944732	998225	946506	1053493	44	55267	1774
17	944775	998222	946553	1053446	43	55224	1777
18	944819	998218	946600	1053399	42	55180	1781
19	944862	998214	946647	1053352	41	55137	1785
20	944905	998210	946694	1053305	40	55094	1789
21	944948	998207	946741	1053258	39	55051	1792
22	944991	998203	946788	1053211	38	55008	1796
23	945034	998199	946834	1053165	37	54965	1800
24	945077	998196	946881	1053118	36	54922	1803
25	945120	998192	946928	1053071	35	54879	1807
26	945163	998188	946974	1053025	34	54836	1811
27	945206	998184	947021	1052978	33	54793	1815
28	945248	998181	947067	1052932	32	54751	1818
29	945291	998177	947114	1052885	31	54708	1822
30	945334	998173	947160	1052839	30	54665	1826
	Sine Compl.	Sine.	Tangent Compl.	Tang	73	Secans.	Secans.

16	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	945334	998273	947160	1052839	30	54665	1001826
31	945376	998169	947206	1052793	29	54623	1830
32	945419	998166	947253	1052746	28	54580	1833
33	945461	998162	947299	1052700	27	54538	1837
34	945504	998158	947345	1052654	26	54405	1841
35	945546	998154	947391	1052608	25	54453	1845
36	945589	998151	947438	1052561	24	54410	1848
37	945631	998147	947484	1052515	23	54368	1852
38	945673	998143	947530	1052469	22	54326	1856
39	945716	998139	947576	1052423	21	54283	1860
40	945758	998136	947622	1052377	20	54241	1863
41	945800	998132	947668	1052331	19	54199	1867
42	945842	998128	947714	1052285	18	54157	1871
43	945884	998124	947760	1052239	17	54115	1875
44	945926	998120	947805	1052194	16	54073	1879
45	945968	998117	947851	1052148	15	54031	1882
46	946010	998113	947897	1052102	14	53989	1886
47	946052	998109	947943	1052056	13	53947	1890
48	946094	998105	947988	1052011	12	53905	1894
49	946136	998101	948034	1051965	11	53863	1898
50	946178	998098	948080	1051919	10	53821	1901
51	946219	998094	948125	1051874	9	53780	1905
52	946261	998090	948171	1051828	8	53738	1909
53	946303	998086	948216	1051783	7	53696	1913
54	946344	998082	948262	1051737	6	53655	1917
55	946386	998078	948307	1051692	5	53613	1921
56	946427	998075	948352	1051647	4	53572	1924
57	946469	998071	948398	1051601	3	53530	1928
58	946510	998067	948443	1051556	2	53489	1932
59	946552	998063	948488	1051511	1	53447	1936
60	946593	998059	948533	1051466	0	53406	1940
	Sine Compl.	Sine.	Tangent Compl.	Tang	73	Secans.	Secans.

17	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Si Co.
0	946593	998059	948533	1051466	60	53406	1001940
1	946634	998055	948579	1051420	59	53365	1944
2	946676	998051	948624	1051375	58	53323	1948
3	946717	998048	948669	1051330	57	53282	1951
4	946758	998044	948714	1051285	56	53241	1955
5	946799	998040	948759	1051240	55	53200	1959
6	946840	998036	948804	1051195	54	53159	1963
7	946881	998032	948849	1051150	53	53118	1967
8	946922	998028	948894	1051105	52	53077	1971
9	946963	998024	948938	1051061	51	53036	1975
10	947004	998020	948983	1051016	50	52995	1979
11	947045	998016	949028	1050971	49	52954	1983
12	947086	998012	949073	1050926	48	52913	1987
13	947127	998009	949118	1050881	47	52872	1990
14	947167	998005	949162	1050837	46	52832	1994
15	947208	998001	949207	1050792	45	52791	1998
16	947249	997997	949251	1050748	44	52750	2002
17	947289	997993	949296	1050703	43	52710	2006
18	947330	997989	949340	1050659	42	52669	2010
19	947370	997985	949385	1050614	41	52627	2014
20	947411	997981	949429	1050570	40	52588	2018
21	947451	997977	949474	1050525	39	52548	2022
22	947492	997973	949518	1050481	38	52507	2026
23	947532	997969	949562	1050437	37	52467	2030
24	947573	997965	949607	1050392	36	52426	2034
25	947613	997961	949651	1050348	35	52386	2038
26	947653	997957	949695	1050304	34	52346	2042
27	947693	997953	949739	1050260	33	52306	2046
28	947733	997949	949784	1050215	32	52266	2050
29	947774	997945	949828	1050171	31	52225	2054
30	947814	997941	949872	1050127	30	52185	2058
	Sine Compl.	Sine.	Tangent Compl.	Tang	72	Secans.	Secans.

17	Sine.	Sine Compl.	Tang	Tangent Compl.	Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	947814	997941	949872	1050127	30 52185	1002058
31	947854	997931	949916	1050083	29 52145	2062
32	947894	997933	949960	1050039	28 52105	2066
33	947934	997929	950004	1049999	27 52065	2070
34	947974	997925	950048	1049955	26 52025	2074
35	948014	997921	950092	1049907	25 51985	2078
36	948053	997917	950135	1049864	24 51946	2082
37	948093	997913	950179	1049820	23 51906	2086
38	948133	997909	950223	1049776	22 51886	2090
39	948173	997905	950267	1049732	21 51826	2094
40	948212	997901	950310	1049689	20 51787	2098
41	948252	997897	950354	1049645	19 51747	2102
42	948292	997893	950398	1049601	18 51707	2106
43	948331	997889	950441	1049558	17 51668	2110
44	948371	997885	950485	1049514	16 51628	2114
45	948410	997881	950528	1049471	15 51589	2118
46	948450	997877	950572	1049427	14 51549	2122
47	948489	997873	950615	1049384	13 51510	2126
48	948528	997869	950659	1049340	12 51471	2130
49	948568	997865	950702	1049297	11 51431	2134
50	948607	997861	950746	1049253	10 51392	2138
51	948646	997857	950789	1049210	9 51353	2142
52	948685	997853	950832	1049167	8 51314	2146
53	948725	997849	950875	1049124	7 51274	2150
54	948764	997845	950919	1049080	6 51235	2154
55	948803	997841	950962	1049037	5 51196	2158
56	948842	997837	951005	1048994	4 51157	2162
57	948881	997832	951048	1048951	3 51118	2167
58	948920	997828	951091	1048908	2 51079	2171
59	948959	997824	951134	1048865	1 51040	2175
60	948998	997820	951177	1048822	0 51001	2179
	Sine Compl.	Sine.	Tangent Compl.	Tang.	72 Secans.	Secans.

18	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	948998	997820	951177	1048822	60	51001	1002179
1	949037	997816	951220	1048779	59	50962	2183
2	949075	997812	951263	1048736	58	50924	2187
3	949114	997808	951306	1048693	57	50885	2191
4	949153	997804	951349	1048650	56	50846	2195
5	949192	997800	951392	1048607	55	50807	2199
6	949230	997795	951434	1048565	54	50769	2204
7	949269	997791	951477	1048522	53	50730	2208
8	949308	997787	951520	1048479	52	50691	2212
9	949346	997783	951563	1048436	51	50653	2216
10	949385	997779	951605	1048394	50	50614	2220
11	949423	997775	951648	1048351	49	50576	2224
12	949462	997771	951690	1048309	48	50537	2228
13	949500	997760	951733	1048266	47	50499	2233
14	949538	997762	951776	1048223	46	50461	2237
15	949577	997758	951818	1048181	45	50422	2241
16	949615	997754	951861	1048138	44	50384	2245
17	949653	997750	951803	1048096	43	50346	2249
18	949691	997746	951945	1048054	42	50308	2253
19	949730	997741	951988	1048011	41	50269	2258
20	949768	997737	952030	1047969	40	50231	2262
21	949806	997733	952072	1047927	39	50193	2266
22	949844	997729	952115	1047884	38	50153	2270
23	949882	997725	952157	1047842	37	50117	2274
24	949920	997720	952199	1047800	36	50079	2279
25	949958	997716	952241	1047758	35	50041	2283
26	949996	997712	952283	1047716	34	50003	2287
27	950034	997708	952325	1047674	33	49965	2291
28	950072	997704	952367	1047632	32	49927	2295
29	950109	997699	952409	1047590	31	49890	2300
30	950147	997695	952451	1047548	30	49852	2304
	Sine Comp.	Sine.	Tangent Comp.	Tang	71	Secans.	Secans.

18	Sine.	Sine Compl.	Tang	Tangent Compl.	Com. Ar. of Sine.	Com. Ar. of Sine Co.
20	950147	997695	952451	1047548	30	49852 1002304
31	950185	997691	952493	1047506	29	49814 2308
32	950223	997687	952535	1047464	28	49776 2312
33	950260	997682	952577	1047422	27	49739 2317
34	950298	997678	952619	1047380	26	49701 2321
35	950335	997674	952661	1047338	25	49664 2325
36	950373	997670	952703	1047296	24	49626 2329
37	950411	997665	952745	1047254	23	49588 2334
38	950448	997661	952786	1047213	22	49551 2338
39	950485	997657	952828	1047171	21	49514 2342
40	950523	997653	952870	1047129	20	49476 2346
41	950560	997648	952911	1047088	19	49439 2351
42	950598	997644	952953	1047046	18	49401 2355
43	950635	997640	952995	1047004	17	49364 2359
44	950672	997636	953036	1046963	16	49327 2363
45	950709	997631	953078	1046921	15	49290 2368
46	950747	997627	953119	1046880	14	49252 2372
47	950784	997623	953161	1046838	13	49215 2376
48	950821	997618	953202	1046797	12	49178 2381
49	950858	997614	953243	1046756	11	49141 2385
50	950895	997610	953285	1046714	10	49104 2389
51	950932	997605	953326	1046673	9	49067 2394
52	950969	997601	953367	1046632	8	49030 2398
53	951006	997597	953409	1046590	7	48993 2402
54	951043	997593	953450	1046549	6	48956 2406
55	951080	997588	953491	1046508	5	48919 2411
56	951117	997584	953532	1046467	4	48882 2415
57	951153	997580	953573	1046426	3	48846 2419
58	951190	997575	953615	1046384	2	48809 2424
59	951227	997571	953656	1046343	1	48772 2428
60	951264	997567	953697	1046302	0	48735 2432
	Sine Compl.	Sine	Tangent Compl.	Tang.	71	Secans. Secans.

19	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	951264	997567	953697	1046302	60	48735	1002432
1	951300	997562	953738	1046261	59	48699	2437
2	951337	997558	953779	1046220	58	48662	2441
3	951374	997553	953820	1046179	57	48625	2446
4	951410	997549	953861	1046138	56	48589	2450
5	951447	997545	953902	1046098	55	48552	2454
6	951483	997540	953942	1046057	54	48516	2459
7	951520	997536	953983	1046016	53	48479	2463
8	951556	997532	954024	1045975	52	48443	2467
9	951593	997527	954065	1045934	51	48407	2472
10	951629	997523	954106	1045893	50	48370	2476
11	951665	997518	954146	1045853	49	48334	2481
12	951701	997514	954187	1045812	48	48298	2485
13	951738	997510	954228	1045771	47	48261	2489
14	951774	997505	954268	1045731	46	48225	2494
15	951810	997501	954309	1045690	45	48189	2498
16	951846	997496	954349	1045650	44	48153	2503
17	951882	997492	954390	1045609	43	48117	2507
18	951919	997488	954431	1045569	42	48080	2511
19	951955	997483	954471	1045528	41	48044	2516
20	951991	997479	954511	1045488	40	48008	2520
21	952027	997474	954552	1045447	39	47972	2525
22	952063	997470	954592	1045407	38	47936	2529
23	952098	997465	954633	1045366	37	47901	2534
24	952134	997461	954673	1045326	36	47865	2538
25	952170	997456	954713	1045286	35	47829	2543
26	952206	997452	954754	1045245	34	47793	2547
27	952242	997448	954794	1045205	33	47757	2551
28	952278	997443	954834	1045165	32	47721	2556
29	952313	997439	954874	1045125	31	47686	2560
30	952349	997434	954914	1045085	30	47650	2565
	Sine Comp.	Sine.	Tangent Comp.	Tang	70	Secans.	Secans.

19	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Si. Co.
30	952349	997434	954914	1045085	30	47650	1002565
31	952385	997430	954955	1045045	29	47614	2569
32	952420	997425	954995	1045004	28	47579	2574
33	952456	997421	955035	1044964	27	47543	2578
34	952491	997416	955075	1044924	26	47508	2583
35	952527	997412	955115	1044884	25	47472	2587
36	952562	997407	955155	1044844	24	47437	2592
37	952598	997403	955195	1044804	23	47401	2596
38	952633	997398	955235	1044764	22	47366	2601
39	952669	997394	955275	1044724	21	47330	2605
40	952704	997389	955314	1044685	20	47295	2610
41	952739	997385	955354	1044645	19	47260	2614
42	952775	997380	955394	1044605	18	47224	2619
43	952810	997376	955434	1044565	17	47189	2623
44	952845	997371	955474	1044525	16	47154	2628
45	952880	997367	955513	1044486	15	47119	2632
46	952916	997362	955553	1044446	14	47083	2637
47	952951	997358	955593	1044406	13	47048	2641
48	952986	997353	955632	1044367	12	47013	2646
49	953021	997348	955672	1044327	11	46978	2651
50	953056	997344	955712	1044287	10	46943	2655
51	953091	997339	955751	1044248	9	46908	2660
52	953126	997335	955791	1044208	8	46873	2664
53	953161	997330	955830	1044169	7	46838	2669
54	953196	997326	955870	1044129	6	46803	2673
55	953231	997321	955909	1044090	5	46768	2678
56	953266	997316	955949	1044050	4	46733	2683
57	953300	997312	955988	1044011	3	46699	2687
58	953335	997307	956027	1043972	2	46664	2692
59	953376	997303	956067	1043932	1	46629	2696
60	953405	997398	956106	1043890	0	46594	2701
	Sine Compl.	Sine.	Tangent Compl.	Tang	70	Secans.	Secans.

20	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	953405	997298	956106	1043893	60	46594	1002701
1	953439	997293	956145	1043854	59	46560	2706
2	953474	997289	956185	1043814	58	46525	2710
3	953509	997284	956224	1043775	57	46490	2715
4	953543	997280	956263	1043736	56	46456	2719
5	953578	997275	956302	1043697	55	46421	2724
6	953612	997270	956341	1043658	54	46387	2729
7	953647	997266	956381	1043618	53	46352	2733
8	953681	997261	956420	1043579	52	46318	2738
9	953716	997257	956459	1043540	51	46283	2742
10	953750	997252	956498	1043501	50	46249	2747
11	953785	997247	956537	1043462	49	46214	2752
12	953819	997243	956576	1043423	48	46180	2756
13	953853	997238	956615	1043384	47	46146	2761
14	953888	997233	956654	1043345	46	46111	2766
15	953922	997229	956693	1043306	45	46077	2770
16	953956	997224	956732	1043267	44	46043	2775
17	953990	997219	956770	1043229	43	46009	2780
18	954024	997215	956809	1043190	42	45975	2784
19	954059	997210	956848	1043151	41	45940	2789
20	954093	997205	956887	1043112	40	45906	2794
21	954127	997201	956926	1043073	39	45872	2798
22	954161	997196	956964	1043035	38	45838	2803
23	954195	997191	957003	1042996	37	45804	2808
24	954229	997187	957042	1042957	36	45770	2812
25	954263	997182	957080	1042919	35	45736	2817
26	954297	997177	957119	1042880	34	45702	2822
27	954331	997172	957158	1042841	33	45668	2827
28	954364	997168	957196	1042803	32	45634	2831
29	954398	997163	957235	1042764	31	45601	2836
30	954432	997158	957273	1042726	30	45567	2841
	Sine Compl.	Sine.	Tangent Compl.	Tang	69	Secans.	Secans.

20	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Si. Co.
30	954432	997158	957273	1042726	30	45567	1002841
31	954466	997154	957312	1042687	29	45533	2845
32	954500	997149	957350	1042649	28	45499	2850
33	954533	997144	957389	1042610	27	45466	2855
34	954567	997139	957427	1042572	26	45432	2860
35	954601	997135	957466	1042533	25	45398	2864
36	954634	997130	957504	1042495	24	45365	2869
37	954668	997125	957542	1042457	23	45331	2874
38	954701	997120	957581	1042418	22	45298	2879
39	954735	997116	957619	1042380	21	45264	2883
40	954768	997111	957657	1042342	20	45231	2888
41	954802	997106	957695	1042304	19	45197	2893
42	954835	997101	957734	1042265	18	45164	2898
43	954869	997097	957772	1042227	17	45130	2902
44	954902	997092	957810	1042189	16	45097	2907
45	954936	997087	957848	1042151	15	45063	2912
46	954969	997082	957886	1042113	14	45030	2917
47	955002	997077	957924	1042075	13	44997	2922
48	955035	997073	957962	1042037	12	44964	2926
49	955069	997068	958000	1041999	11	44930	2931
50	955102	997063	958038	1041961	10	44897	2936
51	955135	997058	958076	1041923	9	44864	2941
52	955168	997053	958114	1041885	8	44831	2946
53	955201	997049	958152	1041847	7	44798	2950
54	955234	997044	958190	1041809	6	44765	2955
55	955268	997039	958228	1041771	5	44731	2960
56	955301	997034	958266	1051733	4	44698	2965
57	955334	997029	958304	1041695	3	44665	2970
58	955367	997024	958342	1041657	2	44632	2975
59	955399	997020	958379	1041620	1	44600	2979
60	955432	997015	958417	1041582	0	44567	2984
	Sine Compl.	Sine.	Tangent Compl.	Tang	69	Secans.	Secans.

21	Sine.	Sine Compl.	Tang	Tangent Compl.	Com Ar of Sine.	Com. Ar. of Sine Co.
0	955432	997015	958417	1041582	60	44567 1002984
1	955465	997010	958455	1041544	59	44534 2989
2	955498	997005	958493	1041506	58	44501 2994
3	955531	997000	958530	1041469	57	44468 2999
4	955564	996995	958568	1041431	56	44435 3004
5	955597	996990	958606	1041393	55	44402 3009
6	955629	996986	958643	1041356	54	44370 3014
7	955662	996981	958681	1041318	53	44337 3018
8	955695	996976	958719	1041280	52	44304 3023
9	955727	996971	958756	1041243	51	44272 3028
10	955760	996966	958794	1041205	50	44239 3033
11	955793	996951	958831	1041168	49	44206 3038
12	955825	996956	958869	1041130	48	44174 3043
13	955858	996951	958906	1041093	47	44141 3048
14	955890	996946	958944	1041055	46	44109 3053
15	955923	996941	958981	1041018	45	94076 4058
16	955955	996937	959018	1040981	44	44044 3062
17	955988	996932	959056	1040943	43	44011 3067
18	956020	996927	959093	1040906	42	43979 3072
19	956053	996922	959130	1040869	41	43946 3077
20	956085	996917	959168	1140831	40	43914 3082
21	956117	996912	959205	1040794	39	43882 3087
22	956150	996907	959242	1040757	38	43849 3092
23	956182	996902	959279	1040720	37	43817 3097
24	956214	996897	959317	1040682	36	43785 3102
25	956246	996892	959354	1040645	35	43753 3107
26	956279	996887	959391	1040608	34	43720 3112
27	956311	996882	959428	1040571	33	43688 3117
28	956343	996877	959465	1040534	32	43656 3122
29	956375	996872	959502	1040497	31	43624 3127
30	956407	996867	959539	1040460	30	43592 3132
	Sine Compl.	Sine	Tangent Compl.	Tang	68	Secans. Secans.

Sine.	Sine Comp.	Tang	Tangent Compl.	Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	956407	996867	959539	1040460	30 43592 1003132
31	956439	996862	959576	1040423	29 43560 3137
32	956471	996857	959613	1040386	28 43528 3142
33	956503	996852	959650	1040349	27 43496 3147
34	956535	996847	959687	1040312	26 43464 3152
35	956567	996842	959724	1040275	25 43432 3157
36	956599	996837	959761	1040238	24 43400 3162
37	956631	996832	959798	1040201	23 43368 3167
38	956663	996827	959835	1040164	22 43336 3172
39	956695	996822	959872	1040127	21 43304 3177
40	956726	996817	959909	1040090	20 43273 3182
41	956758	996812	959945	1040054	19 43241 3187
42	956790	996807	959982	1040017	18 43209 3192
43	956822	996802	960019	1039980	17 43177 3197
44	956853	996797	960056	1039943	16 43146 3202
45	956885	996792	960092	1039907	15 43114 3207
46	956917	996787	960129	1039870	14 43082 3212
47	956948	996782	960166	1039833	13 43051 3217
48	956980	996777	960202	1039797	12 43019 3222
49	957012	996772	960239	1039760	11 42988 3227
50	957043	996767	960276	1039723	10 42956 3232
51	957075	996762	960312	1039687	9 42924 3237
52	957106	996757	960349	1039650	8 42893 3242
53	957138	996752	960385	1039614	7 42861 3247
54	957169	996747	960422	1039577	6 42830 3252
55	957200	996742	960458	1039541	5 42799 3257
56	957232	996736	960495	1039504	4 42767 3262
57	957263	996731	960531	1039468	3 42736 3268
58	957294	996726	960568	1039431	2 42705 3273
59	957326	996721	960604	1039395	1 42673 3278
60	957357	996716	960640	1039359	0 42642 3283
Sine Compl.	Sine.	Tangent Compl.	Tang	Secans.	Setans.

22	Sine.	Sine Comp	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	957357	996716	960640	1039359	60	42642	1003283
1	957388	996711	960677	1039322	59	42611	3288
2	957420	996706	960713	1039286	58	42579	3293
3	957451	996701	960749	1039250	57	42548	3298
4	957482	996696	960786	1039213	56	42517	3303
5	957513	996691	960822	1039177	55	42486	3308
6	957544	996685	960858	1039141	54	42455	3314
7	957575	996680	960895	1039104	53	42424	3319
8	957606	996675	960931	1039068	52	42393	3324
9	957637	996670	960967	1039032	51	42362	3329
10	957668	996665	961033	1038996	50	42331	3334
11	957699	996660	961039	1038960	49	42300	3339
12	957730	996655	961075	1038924	48	42269	3344
13	957761	996649	961118	1038888	47	42238	3350
14	957792	996644	961111	1038851	46	42207	3355
15	957823	996639	961148	1038815	45	42176	3360
16	957854	996634	961220	1038779	44	42145	3365
17	957885	996629	961256	1038743	43	42114	3370
18	957916	996624	961292	1038701	42	42083	3375
19	957946	996618	961328	1038677	41	42053	3381
20	957977	996613	961364	1038635	40	42022	3386
21	958008	996608	961400	1038600	39	41991	3391
22	958039	996603	961435	1038564	38	41960	3396
23	958069	996598	961471	1038528	37	41930	3401
24	958100	996592	961507	1038492	36	41899	3407
25	958131	996587	961543	1038456	35	41868	3412
26	958161	996582	961579	1038420	34	41838	3417
27	958192	996577	961615	1038384	33	41807	3422
28	958222	996571	961650	1038349	32	41777	3428
29	958253	996566	961686	1038313	31	41746	3433
30	958283	996561	961722	1038277	30	41716	3438
	Sine Compl.	Sine.	Tangent Compl.	Tang	67	Secans.	Secans.

	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
22	958282	996561	961722	1038277	30	41716	1003438
31	958314	996556	961758	1038241	29	41685	3443
32	958344	996551	961793	1038206	28	41655	3448
33	958375	996545	961829	1038170	27	41624	3454
34	958405	996540	961865	1038134	26	41594	3459
35	958436	996535	961900	1038099	25	41563	3464
36	958466	996530	961936	1038063	24	41533	3469
37	958496	996524	961972	1038027	23	41503	3475
38	958527	996519	962007	1037992	22	41472	3480
39	958557	996514	962043	1037956	21	41442	3485
40	958587	996508	962078	1037921	20	41412	3491
41	958617	996503	962114	1037885	19	41382	3496
42	958648	996498	962149	1037850	18	41351	3501
43	958678	996493	962185	1037814	17	41321	3506
44	958708	996487	962220	1037779	16	41291	3512
45	958738	996482	962256	1037743	15	41261	3517
46	958768	996477	962291	1037708	14	41231	3522
47	958798	996471	962326	1037673	13	41201	3528
48	958828	996466	962362	1037637	12	41171	3533
49	958858	996461	962397	1037602	11	41141	3538
50	958888	996456	962432	1037567	10	41111	3543
51	958918	996450	962468	1037531	9	41081	3549
52	958948	996445	962503	1037496	8	41051	3554
53	958978	996440	962538	1037461	7	41021	3559
54	958008	996434	962574	1037425	6	40991	3565
55	958038	996429	962609	1037390	5	40961	3570
56	959068	996424	962644	1037355	4	40931	3575
57	959098	996418	962679	1037320	3	40901	3581
58	959128	996413	962714	1037285	2	40871	3586
59	959158	996407	962750	1037249	1	40841	3592
60	959187	996402	962785	1037214	0	40812	3597
	Sine Compl.	Sine.	Tangent Compl.	Tang	67	Secans.	Secans.

23	Sine.	Sine Comp.	Tang.	Tangent Compl.	Com. Ar. of Sine.	Com. Ar. of Sine Co.	
0	959187	996402	962785	1037214	60	40812	1003597
1	959217	996397	962820	1037179	59	40782	3602
2	959247	996391	962855	1037144	58	40752	3608
3	959276	996386	962890	1037109	57	40723	3613
4	959306	996381	962925	1037074	56	40693	3618
5	959336	996375	962960	1037039	55	40663	3624
6	959365	996370	962995	1037004	54	40634	3629
7	959395	996364	963030	1036969	53	40604	3635
8	959425	996359	963065	1036934	52	40574	3640
9	959454	996354	963100	1036899	51	40545	3645
10	959484	996348	963135	1036864	50	40515	3651
11	959513	996343	963170	1036829	49	40486	3656
12	959543	996337	963205	1036794	48	40456	3662
13	959572	996332	963240	1036759	47	40427	3667
14	959602	996327	963275	1036724	46	40397	3672
15	959631	996321	963309	1036690	45	40368	3678
16	959660	996316	963344	1036655	44	40339	3683
17	959690	996310	963379	1036620	43	40309	3689
18	959719	996305	963414	1036585	42	40280	3694
19	959748	996299	963449	1036550	41	40251	3700
20	959778	996294	963483	1036516	40	40221	3706
21	959807	996289	963518	1036481	39	40192	3711
22	959836	996283	963553	1036446	38	40163	3717
23	959866	996278	963587	1036412	37	40133	3722
24	959895	996272	963622	1036377	36	40104	3728
25	959924	996267	963657	1036342	35	40075	3733
26	959953	996261	963691	1036308	34	40046	3739
27	959982	996256	963726	1036273	33	40017	3744
28	960011	996250	963761	1036238	32	39988	3749
29	960040	996245	963795	1036204	31	39959	3755
30	960069	996239	963830	1036169	30	39930	3760
	Sine Compl.	Sine.	Tangent Compl.	Tang.	Secant.	Secant.	

	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	960069	996129	963830	1036169	30	39930	1003760
31	960099	996234	963864	1035135	29	39900	3765
32	960128	996228	963899	1035100	28	39871	3771
33	960157	996223	963933	1035066	27	39842	3776
34	960186	996217	963968	1035031	26	39814	3782
35	960214	996212	964002	1035997	25	39785	3787
36	960243	996206	964037	1035962	24	39756	3793
37	960272	996201	964071	1035928	23	39727	3798
38	960301	996195	964105	1035894	22	39698	3804
39	960330	996190	964140	1035859	21	39669	3809
40	960359	996184	964174	1035825	20	39640	3815
41	960388	996179	964209	1035790	19	39611	3820
42	960416	996173	964243	1035756	18	39583	3826
43	960445	996168	964277	1035722	17	39554	3832
44	960474	996162	964312	1035687	16	39525	3837
45	960503	996156	964346	1035653	15	39496	3843
46	960531	996151	964380	1035619	14	39468	3848
47	960560	996145	964414	1035585	13	39439	3854
48	960587	996140	964449	1035550	12	39410	3859
49	960617	996134	964483	1035516	11	39382	3865
50	960646	996129	964517	1035482	10	39353	3870
51	960675	996123	964551	1035448	9	39324	3876
52	960703	996117	964585	1035414	8	39296	3882
53	960732	996112	964619	1035380	7	39267	3887
54	960760	996106	964654	1035346	6	39239	3893
55	960789	996101	964688	1035311	5	39210	3898
56	960817	996095	964722	1035277	4	39181	3904
57	960846	996089	964756	1035243	3	39153	3910
58	960874	996084	964790	1035209	2	39125	3915
59	960902	996078	964824	1035175	1	39097	3921
60	960931	996073	964858	1035141	0	39068	3926
	Sine Compl.	Sine.	Tangent Compl.	Tang	66	Secans.	Secans.

24	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	960931	996073	964858	1035141	60	39068	1003926
1	960959	996067	964892	1035107	59	39040	3932
2	960988	996061	964926	1035073	58	39011	3938
3	961016	996056	964960	1035039	57	38982	3943
4	961044	996050	964994	1035005	56	38955	3949
5	961072	996044	965028	1034971	55	38927	3955
6	961101	996039	965061	1034938	54	38898	3960
7	961129	996033	965095	1034904	53	38870	3966
8	961157	996027	965129	1034870	52	38842	3972
9	961185	996022	965163	1034836	51	38814	3977
10	961213	996016	965197	1034802	50	38786	3983
11	961242	996010	965231	1034768	49	38757	3989
12	961270	996005	965265	1034734	48	38729	3994
13	961298	995999	965298	1034701	47	38701	4000
14	961326	995993	965332	1034667	46	38673	4006
15	961354	995988	965366	1034633	45	38645	4011
16	961382	995982	965400	1034599	44	38617	4017
17	961410	995976	965433	1034566	43	38589	4023
18	961438	995971	965467	1034532	42	38561	4028
19	961466	995965	965501	1034498	41	38533	4034
20	961494	995959	965534	1034465	40	38505	4040
21	961522	995953	965568	1034431	39	38477	4046
22	961550	995948	965602	1034397	38	38449	4051
23	961578	995942	965635	1034364	37	38421	4057
24	961605	995936	965669	1034330	36	38394	4063
25	961623	995931	965702	1034297	35	38366	4068
26	961661	995925	965736	1034263	34	38338	4074
27	961689	995919	965769	1034230	33	38310	4080
28	961717	995913	965803	1034196	32	38282	4086
29	961744	995908	965836	1034163	31	38255	4092
30	961772	995902	965870	1034129	30	38227	4098
	Sine Compl.	Sine.	Tangent Compl.	Tang	63	Secans.	Secans.

24	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	961772	995902	965870	1034129	30	38227	1004097
31	961800	995896	965903	1034096	29	38199	4103
32	961828	995890	965937	1034062	28	38171	4109
33	961855	995885	965970	1034029	27	38144	4115
34	961883	995879	966004	1033995	26	38116	4120
35	961911	995873	966037	1033962	25	38088	4126
36	961938	995867	966070	1033929	24	38061	4132
37	961966	995861	966104	1033895	23	38033	4138
38	961993	995856	966137	1033862	22	38006	4143
39	962021	995850	966171	1033828	21	37978	4149
40	962048	995844	966204	1033795	20	37951	4155
41	962076	995838	966237	1033762	19	37923	4161
42	962103	995832	966270	1033729	18	37896	4167
43	962131	995827	966304	1033695	17	37868	4172
44	962158	995821	966337	1033662	16	37841	4178
45	962186	995815	966370	1033629	15	37813	4184
46	962213	995809	966403	1033596	14	37786	4190
47	962240	995803	966437	1033562	13	37759	4196
48	962268	995797	966470	1033529	12	37731	4202
49	962295	995792	966503	1033496	11	37704	4207
50	962322	995786	966536	1033463	10	37677	4213
51	962350	995780	966569	1033430	9	37649	4219
52	962377	995774	966602	1033397	8	37622	4225
53	962404	995768	966635	1033364	7	37595	4231
54	962431	995762	966669	1033330	6	37568	4237
55	962459	995756	966702	1033297	5	37540	4243
56	962486	995751	966735	1033264	4	37513	4248
57	962513	995745	966768	1033231	3	37486	4254
58	962540	995739	966801	1033198	2	37459	4260
59	962567	995733	966834	1033165	1	37432	4266
60	962594	995727	966867	1033132	0	37405	4272
	Sine Compl.	Sine.	Tangens Compl.	Tang.	65	Secans.	Secans.

25	Sine	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Si. Co.
0	962594	995727	966867	1033132	60	37405	1004272
1	962621	995721	966900	1033099	59	37378	4278
2	962684	995715	966933	1033066	58	37351	4284
3	962667	995709	966966	1033033	57	37323	4290
4	962703	995703	966999	1033000	56	37296	4296
5	962730	995698	967031	1032968	55	37269	4301
6	962757	995692	967064	1032935	54	37242	4307
7	962783	995686	967097	1032902	53	37216	4313
8	962810	995680	967130	1032869	52	37189	4319
9	962837	995674	967163	1032836	51	37162	4325
10	962864	995668	967196	1032803	50	37135	4331
11	962891	995662	967229	1032770	49	37108	4337
12	962918	995656	967261	1032738	48	37081	4343
13	962945	995650	967294	1032705	47	37054	4349
14	962972	995644	967327	1032672	46	37027	4355
15	962998	995638	967360	1032639	45	37001	4361
16	963025	995632	967392	1032607	44	36974	4367
17	963052	995626	967425	1032574	43	36947	4373
18	963070	995620	967458	1032541	42	36920	4379
19	963105	995614	967491	1032508	41	36984	4385
20	963132	995608	967523	1032476	40	36867	4391
21	963159	995602	967556	1032443	39	36840	4397
22	963185	995596	967589	1032410	38	36814	4403
23	963212	995590	967621	1032378	37	36787	4409
24	963239	995584	967654	1032345	36	36760	4415
25	963265	995578	967686	1032313	35	36734	4421
26	963292	995572	967719	1032280	34	36707	4427
27	963318	995566	967752	1032247	33	36681	4433
28	963345	995560	967784	1032215	32	36654	4439
29	963371	995554	967817	1032182	31	36628	4445
30	963398	995548	967849	1032150	30	36601	4451
	Sine Compl.	Sine.	Tangent Compl.	Tang	64	Secans.	Secans.

Sine.	Sine Compl.	Tang	Tangent Compl.	Comp. Ar. of Sine.	Comp. Ar. of Sine Co.
29 963398	995548	967849	1032150	30 36601	1004451
31 963424	995542	967882	1032117	29 36575	4457
32 963451	995536	967914	1032085	28 36548	4463
33 963477	995530	967947	1032052	27 36522	4469
34 963504	995524	967979	1032020	26 36495	4475
35 963530	995518	968011	1031988	25 36469	4481
36 963556	995512	968044	1031955	24 36443	4487
37 963583	995506	968076	1031923	23 36416	4493
38 963609	995500	968109	1031890	22 36390	4499
39 963636	995494	968141	1031858	21 36363	4505
40 963662	995488	968173	1031826	20 36337	4511
41 963688	995482	968206	1031793	19 36311	4517
42 963714	995476	968238	1031761	18 36285	4523
43 963741	995470	968270	1031729	17 36258	4529
44 963767	995464	968303	1031696	16 36232	4535
45 963793	995457	968335	1031664	15 36206	4542
46 963819	995451	968367	1031632	14 36180	4548
47 963845	995445	968400	1031599	13 36154	4554
48 963871	995439	968432	1031567	12 36128	4560
49 963898	995433	968464	1031535	11 36101	4566
50 963924	995427	968496	1031503	10 36075	4572
51 963950	995421	968529	1031470	9 36049	4578
52 963976	995415	968561	1031438	8 36023	4584
53 964002	995409	968593	1031406	7 35997	4590
54 964028	995402	968625	1031374	6 35971	4597
55 964059	995396	968657	1031342	5 35945	4603
56 964080	995390	968689	1031310	4 35919	4609
57 964106	995384	968721	1031278	3 35893	4615
58 964132	995378	968754	1031245	2 35867	5621
59 964158	995372	968786	1031213	1 35841	5627
60 964184	995366	968818	1031181	0 35815	5633
Sine Compl.	Sine.	Tangent Compl.	Tang.	74 Secans.	Secans.

26	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Si. Co.
0	964184	995366	968818	1031181	60	35815	1004633
1	964210	995359	968850	1031149	59	35789	4640
2	964235	995353	968882	1031117	58	35764	4646
3	964261	995347	968914	1031085	57	35738	4652
4	964287	995341	968946	1031053	56	35712	4658
5	964313	995335	968978	1031021	55	35686	4664
6	964339	995328	969010	1030989	54	35660	4671
7	964365	995322	969042	1030957	53	35634	4677
8	964390	995316	969074	1030925	52	35609	4683
9	964416	995310	969106	1030893	51	35583	4689
10	964442	995304	969138	1030861	50	35557	4695
11	964467	995297	969170	1030830	49	35532	4702
12	964493	995291	969201	1030798	48	35506	4708
13	964519	995285	969233	1030766	47	35480	4714
14	964544	995279	969265	1030734	46	35455	4720
15	964570	995273	969297	1030702	45	35429	4726
16	964596	995266	969329	1030670	44	35403	4733
17	964621	995260	969361	1030638	43	35378	4739
18	964647	995254	969392	1030607	42	35352	4745
19	964672	995248	969424	1030575	41	35327	4751
20	964698	995241	969456	1030543	40	35301	4758
21	964723	995235	969488	1030511	39	35276	4764
22	964749	995229	969520	1030479	38	35250	4770
23	964774	995223	969551	1030448	37	35225	4776
24	964800	995216	969583	1030416	36	35199	4783
25	964825	995210	969615	1030384	35	35174	4789
26	964858	995204	969646	1030353	34	35148	4795
27	964876	995197	969678	1030321	33	35123	4802
28	964902	995191	969710	1030289	32	35097	4808
29	964927	995185	969741	1030258	31	35072	4814
30	964952	995179	969773	1030226	30	35047	4820
	Sine Compl.	Sine.	Tangent Compl.	Tang	63	Secans.	Secans.

26	Sine.	Sine Comp.	Tang	Tangent Compl.	Com. Ar. of Sine.	Com. Ar. of Sine Ca.
30	964952	995179	969773	1030226	30 35047	1004820
31	964978	995172	969805	1030194	29 35021	4827
32	965003	995166	969836	1030163	28 34996	4833
33	965028	995160	969868	1030131	27 34971	4839
34	965053	995153	969900	1030099	26 34946	4846
35	965079	995147	969931	1030068	25 34920	4852
36	965104	995141	969963	1030036	24 34895	4858
37	965129	995134	969994	1030005	23 34870	4865
38	965154	995128	970026	1029973	22 34845	4871
39	965180	995122	970057	1029942	21 34819	4877
40	965205	995115	970089	1029910	20 34794	4884
41	965230	995109	970120	1029879	19 34769	4890
42	965255	995103	970152	1029847	18 34744	4896
43	965280	995096	970183	1029816	17 34719	4903
44	965305	995090	970215	1029784	16 34694	4909
45	965330	995084	970246	1029753	15 34669	4915
46	965355	995077	970278	1029721	14 34644	4922
47	965380	995071	970309	1029690	13 34619	4928
48	965405	995065	970340	1029659	12 34594	4935
49	965430	995058	970372	1029627	11 34569	4941
50	965455	995052	970403	1029596	10 34544	4947
51	965480	995045	970434	1029565	9 34519	4954
52	965505	995039	970466	1029533	8 34494	4960
53	965530	995033	970497	1029502	7 34469	4966
54	965555	995026	970528	1029471	6 34444	4973
55	965580	995020	970560	1029439	5 34419	4979
56	965605	995013	970591	1029408	4 34394	4986
57	965630	995007	970622	1029377	3 34369	4992
58	965655	995000	970654	1029345	2 34344	5999
59	965679	995994	970685	1029314	1 34320	5005
60	965704	995988	970716	1029283	0 34295	5011
	Sine- Comp.	Sine.	Tangent Comp.	Tang	66 Secans.	Secans.

Sine.	Sine Comp.	Tang	Tangent Compl.	Com. Ar. of Sine.	Com. Ar. of Sine Co.
0 965704	994988	970716	1029283	60 34295	1005011
1 965729	994981	970747	1029252	59 34270	5018
2 965754	994973	970779	1029220	58 34245	5024
3 965778	994968	970810	1029189	57 34221	5031
4 965803	994962	970841	1029158	56 34196	5037
5 965828	994955	970872	1029127	55 34171	5044
6 965853	994949	970903	1029096	54 34146	5050
7 965877	994942	970934	1029065	53 34122	5057
8 965902	994936	970966	1029033	52 34097	5063
9 965927	994929	970997	1029002	51 34072	5070
10 965951	994923	971028	1028971	50 34048	5076
11 965976	994917	971059	1028940	49 34023	5083
12 966000	994910	971090	1028909	48 33999	5089
13 966025	994904	971121	1028876	47 33974	5095
14 966050	994897	971152	1028847	46 33949	5102
15 966074	994891	971183	1028816	45 33925	5108
16 966099	994884	971214	1028785	44 33900	5115
17 966123	994877	971245	1028754	43 33876	5122
18 966148	994871	971276	1028723	42 33851	5128
19 966172	994864	971307	1028692	41 33827	5135
20 966197	994858	971338	1028661	40 33802	5141
21 966221	994851	971369	1028630	39 33778	5148
22 966245	994845	971400	1028591	38 33754	5154
23 966270	994838	971431	1028568	37 33729	5161
24 966294	994832	971462	1028537	36 33705	5167
25 966319	994825	971493	1028506	35 33681	5174
26 966343	994819	971524	1028475	34 33656	5180
27 966367	994812	971555	1028444	33 33632	5187
28 966391	994806	971585	1028414	32 33608	5193
29 966416	994799	971616	1028383	31 33583	5200
30 966440	994792	971647	1028352	30 33559	5207
Sine Comp.	Sine.	Tangent Comp.	Tang	62 Secans.	Secans.

27	Sine.	Sine Compl.	Tang.	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sec. Co.
30	966440	994792	971647	1028352	30	33559	1035207
31	966464	994786	971678	1028321	29	33532	5213
32	966489	994779	971709	1028290	28	33510	5220
33	966513	994773	971740	1028259	27	33486	5226
34	966537	994766	971770	1028229	26	33462	5233
35	966561	994759	971801	1028198	25	33438	5240
36	966585	994753	971832	1028167	24	33414	5246
37	966610	994746	971863	1028136	23	33389	5253
38	966634	994740	971894	1028105	22	33365	5259
39	966658	994733	971924	1028075	21	33341	5266
40	966682	994725	971955	1028044	20	33317	5273
41	966706	994720	971986	1028013	19	33293	5279
42	966730	994713	972016	1027983	18	33269	5286
43	966754	994707	972047	1027952	17	33245	5293
44	966778	994700	972078	1027921	16	33221	5299
45	966802	994693	972108	1027891	15	33197	5306
46	966826	994687	972139	1027860	14	33173	5313
47	966850	994680	972170	1027829	13	33149	5319
48	966874	994673	972200	1027799	12	33125	5326
49	966898	994667	972231	1027768	11	33101	5332
50	966922	994660	972262	1027737	10	33077	5339
51	966946	994653	972292	1027707	9	33053	5346
52	966970	994647	972323	1027676	8	33029	5352
53	966994	994640	972353	1027646	7	33005	5359
54	967018	994633	972384	1027615	6	32981	5366
55	967041	994627	972414	1027585	5	32958	5372
56	967067	994620	972445	1027554	4	32934	5379
57	967089	994613	972475	1027524	3	32910	5386
58	967113	994606	972506	1027493	2	32886	5393
59	967137	994600	972536	1027463	1	32862	5399
60	967160	994594	972567	1027432	0	32839	5406
	Sine Compl.	Sine.	Tangent Compl.	Tang.	62	Secans.	Secans.

28	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Si. Co.
0	967160	994593	972567	1027432	60	32839	105406
1	967184	994586	972597	1027402	59	32815	5413
2	967208	994580	972628	1027371	58	32791	5419
3	967232	994573	972658	1027341	57	32767	5429
4	967255	994566	972689	1027310	56	32744	5433
5	967279	994559	972719	1027280	55	32720	5440
6	967303	994553	972750	1027249	54	32696	5446
7	967326	994546	972780	1027219	53	32673	5453
8	967350	994539	972810	1027189	52	32649	5460
9	967374	994532	972841	1027158	51	32625	5467
10	967397	994526	972871	1027128	50	32602	5473
11	967421	994519	972901	1027098	49	32578	5480
12	967444	994512	972932	1027067	48	32555	5487
13	967468	994505	972962	1027037	47	32531	5494
14	967491	994498	972992	1027007	46	32508	5501
15	967515	994492	973023	1026976	45	32484	5507
16	967530	994485	973053	1026946	44	32461	5514
17	967562	994478	973083	1026916	43	32437	5521
18	967585	994471	973114	1026885	42	32414	5528
19	967609	994465	973144	1026855	41	32390	5534
20	967632	994458	973174	1026825	40	32367	5541
21	967656	994451	973204	1026795	39	32343	5548
22	967679	994444	973235	1026764	38	32320	5555
23	967703	994437	973265	1026734	37	32296	5562
24	967726	994430	973295	1026704	36	32273	5569
25	967749	994424	973325	1026674	35	32250	5575
26	967773	994417	973355	1026644	34	32226	5582
27	967796	994410	973386	1026613	33	32203	5589
28	967819	994403	973416	1026583	32	32180	5596
29	967843	994396	973446	1026553	31	32156	5603
30	967866	994389	973476	1026523	30	32133	5610
	Sine Compl.	Sine.	Tangent Compl.	Tang	61	Secans.	Secans.

28	Sine.	Sine Compl.	Tang	Tangent Compl.	Com Ar of Sine.	Com. Ar. of Sine Co
30	967866	994389	974376	1026523	30	32133 1005810
31	967889	994382	973506	1026493	29	32110 5617
32	967912	994376	973536	1026463	28	32087 5623
33	967936	994369	973566	1026433	27	32063 5630
34	967959	994362	973596	1026403	26	32040 5637
35	967982	994355	973626	1026373	25	32017 5644
36	968005	994348	973656	1026343	24	31994 5651
37	968028	994341	973687	1026312	23	31971 5658
38	968051	994334	973717	1026282	22	31948 5665
39	968075	994327	973747	1026252	21	31924 5672
40	968098	994321	973777	1026222	20	31901 5678
41	968121	994314	973807	1026192	19	31878 5685
42	968144	994307	973837	1026162	18	31855 5692
43	968167	994300	973867	1026132	17	31832 5699
44	968190	994293	973897	1026102	16	31809 5706
45	968213	994286	973927	1026072	15	31786 5713
46	968236	994279	973957	1026042	14	31763 5720
47	968259	994272	973986	1026013	13	31740 5727
48	968282	994265	974016	1025983	12	31717 5734
49	968305	994258	974046	1025953	11	31694 5741
50	968328	994251	974076	1025923	10	31671 5748
51	968351	994244	974106	1025893	9	31648 5755
52	968374	994237	974136	1025863	8	31625 5762
53	968397	994230	974166	1025833	7	31602 5769
54	968420	994223	974196	1025803	6	31579 5776
55	968442	994216	974226	1025773	5	31557 5783
56	968465	994209	974255	1025744	4	31534 5790
57	968488	994202	974285	1025714	3	31511 5797
58	968511	994195	974315	1025684	2	31488 5804
59	968534	994188	974345	1025654	1	31465 5811
60	968557	994181	974375	1025624	0	31442 5818
	Sine Compl.	Sine.	Tangent Compl.	Tang	61	Secans. Secans.

Sine.	Sine Compl.	Tang	Tangent Compl.	Com. Ar of Sine.	Com. Ar. of Sine Co.
0968557	994181	974375	1025624	60	31442
1968579	994174	974404	1025595	59	31420
2968602	994167	974434	1025565	58	31397
3968625	994160	974464	1025535	57	31374
4968648	994153	974494	1025505	56	31351
5968670	994146	974524	1025475	55	31329
6968693	994139	974553	1025446	54	31306
7968716	994132	974583	1025416	53	31283
8968738	994125	974613	1025386	52	31261
9968761	994118	974642	1025357	51	31238
10968784	994111	974672	1025327	50	31215
11968806	994104	974702	1025297	49	31193
12968829	994097	974731	1025268	48	31170
13968852	994090	974761	1025238	47	31147
14968874	994083	974791	1025208	46	31125
15968897	994076	974820	1025179	45	31102
16968919	994069	974850	1025149	44	31080
17968942	994062	974880	1025119	43	31057
18968964	994055	974909	1025090	42	31035
19968987	994048	974939	1025060	41	31012
20969009	994040	974968	1025031	40	30990
21969032	994033	974998	1025001	39	30967
22969054	994026	975028	1024971	38	30945
23969077	994019	975057	1024942	37	30922
24969099	994012	975087	1024912	36	30900
25969122	994005	975116	1024883	35	30877
26969144	993998	975146	1024853	34	30855
27969166	993991	975175	1024824	33	30833
28969189	993983	975205	1024794	32	30810
29969211	993976	975234	1024765	31	30788
30969233	993969	975264	1024735	30	30766
Sine Compl.	Sine	Tangent Compl.	Tang	60	Secans.
					Secans.

29	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	969233	993969	975264	1024735	30	30766	1006030
31	969256	993962	975293	1024706	29	30743	6037
32	969278	993955	975323	1024676	28	30721	6044
33	969300	993948	975352	1024647	27	30699	6051
34	969323	993941	975382	1024617	26	30676	6058
35	969345	993933	975411	1024588	25	30654	6066
36	969367	993926	975440	1024559	24	30632	6073
37	969389	993919	975470	1024529	23	30610	6080
38	969412	993912	975499	1024500	22	30587	6087
39	969434	993905	975529	1024470	21	30565	6094
40	969456	993897	975558	1024441	20	30543	6102
41	969478	993890	975587	1024412	19	30521	6109
42	969500	993883	975617	1024382	18	30499	6116
43	969522	993876	975646	1024353	17	30477	6123
44	969545	993869	975675	1024324	16	30454	6130
45	969567	993861	975705	1024294	15	30432	6138
46	969589	993854	975734	1024265	14	30410	6145
47	969611	993847	975763	1024236	13	30388	6152
48	969633	993840	975793	1024206	12	30366	6159
49	969655	993833	975822	1024177	11	30344	6167
50	969677	993825	975851	1024148	10	30322	6174
51	969699	993818	975880	1024119	9	30300	6181
52	969721	993811	975910	1024089	8	30278	6188
53	969743	993804	975939	1024060	7	30256	6196
54	969765	993796	975968	1024031	6	30234	6203
55	969787	993789	975997	1024002	5	30212	6210
56	969809	993782	976027	1023972	4	30190	6217
57	969831	993774	976056	1023943	3	30168	6225
58	969853	993767	976085	1023914	2	30146	6232
59	969875	993760	976114	1023885	1	30124	6239
60	969897	993753	976143	1023856	0	30103	6246
	Sine Compl.	Sine.	Tangent Compl.	Tang	60	Secans.	Secans.

30	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	969897	993753	976143	1023856	60	30103	1006246
1	969918	993745	976173	1023826	59	30081	6254
2	969940	993738	976202	1023797	58	30059	6261
3	969962	993731	976231	1023768	57	30037	6268
4	969984	993723	976260	1023739	56	30015	6276
5	970006	993716	976289	1023710	55	29993	6283
6	970028	993709	976318	1023681	54	29971	6290
7	970049	993701	976347	1023652	53	29950	6298
8	970071	993694	976377	1023622	52	29928	6305
9	970093	993687	976406	1023593	51	29906	6312
10	970115	993679	976435	1023564	50	29884	6320
11	970136	993672	976464	1023535	49	29863	6327
12	970158	993665	976493	1023506	48	29841	6334
13	970180	993657	976522	1023477	47	29819	6342
14	970201	993650	976551	1023448	46	29798	6349
15	970223	993643	976580	1023419	45	29776	6356
16	970245	993635	976609	1023390	44	29754	6364
17	970260	993628	976638	1023361	43	29733	6371
18	970288	993620	976667	1023332	42	29711	6379
19	970310	993613	976696	1023303	41	29689	6386
20	970331	993606	976725	1023274	40	29668	6393
21	970353	993598	976754	1023245	39	29646	6401
22	970374	993591	976783	1023216	38	29625	6408
23	970396	993584	976812	1023187	37	29603	6415
24	970417	993576	976841	1023158	36	29582	6423
25	970439	993569	976870	1023129	35	29560	6432
26	970460	993561	976899	1023100	34	29539	6438
27	970482	993554	976928	1023071	33	29517	6445
28	970503	993546	976957	1023042	32	29496	6453
29	970525	993539	976985	1023014	31	29474	6460
30	970546	993532	977014	1022985	30	29453	6467
	Sine Compl.	Sine.	Tangent Compl.	Tang	59	Secans.	Secans.

Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30 970546	993532	977014	1022985	30	29453	1006467
31 970568	993524	977043	1022956	29	29431	6472
32 970589	993517	977072	1022927	28	29410	6435
33 970611	993509	977101	1022898	27	29388	6490
34 970632	993502	977130	1022869	26	29367	6497
35 970653	993494	977159	1022840	25	29346	6505
36 970675	993487	977188	1022811	24	29324	6512
37 970696	993479	977216	1022783	23	29303	6520
38 970718	993472	977245	1022754	22	29281	6527
39 970739	993464	977274	1022725	21	29260	6535
40 970760	993457	977303	1022696	20	29239	6542
41 970781	993449	977332	1022667	19	29218	6550
42 970803	993442	977360	1022639	18	29196	6557
43 970824	993434	977389	1022610	17	29175	6565
44 970845	993427	977418	1022581	16	29154	6572
45 970866	993419	977447	1022552	15	29133	6580
46 970888	993412	977475	1022524	14	29111	6587
47 970909	993404	977504	1022495	13	29090	6595
48 970930	993397	977533	1022466	12	29069	6602
49 970951	993389	977562	1022437	11	29048	6610
50 970972	993382	977590	1022409	10	29027	6617
51 970994	993374	977619	1022380	9	29005	6625
52 971015	993367	977648	1022351	8	28984	6632
53 971036	993359	977676	1022323	7	28963	6640
54 971057	993352	977705	1022294	6	28942	6647
55 971078	993344	977734	1022265	5	28921	6655
56 971099	993336	977762	1022237	4	28900	6662
57 971120	993329	977791	1022208	3	28879	6670
58 971141	993321	977820	1022179	2	28858	6678
59 971162	993314	977848	1022151	1	28837	6685
60 971183	993306	977877	1022122	0	28816	6693
Sine Compl.	Sine.	Tangent Compl.	Tang	59	Secans.	Secans.

31	Sine.	Sine Comp	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
	0971183	993306	977877	1022122	60	28816	1006693
1	971204	993298	977905	1022094	59	28795	6701
2	971225	993291	977934	1022065	58	28774	6708
3	971246	993283	977963	1022036	57	28753	6716
4	971267	993276	977991	1022008	56	28732	6723
5	971288	993268	978020	1021979	55	28711	6731
6	971309	993260	978048	1021951	54	28690	6739
7	971330	993253	978077	1021922	53	28669	6746
8	971351	993245	978106	1021893	52	28648	6754
9	971372	993238	978134	1021865	51	28627	6761
10	971393	993230	978163	1021836	50	28606	6769
11	971414	993222	978191	1021808	49	28585	6777
12	971435	993215	978220	1021779	48	28564	6784
13	971456	993207	978248	1021751	47	28543	6792
14	971476	993199	978277	1021722	46	28523	6800
15	971497	993192	978305	1021694	45	28502	6807
16	971518	993184	978334	1021665	44	28481	6815
17	971539	993176	978362	1021637	43	28460	6823
18	971560	993169	978391	1021608	42	28439	6830
19	971580	993161	978419	1021580	41	28419	6838
20	971601	993153	978447	1021552	40	28398	6846
21	971622	993146	978476	1021523	39	28377	6853
22	971643	993138	978504	1021495	38	28356	6861
23	971663	993130	978533	1021466	37	28336	6869
24	971684	993122	978561	1021438	36	28315	6877
25	971705	993115	978590	1021409	35	28294	6884
26	971725	993107	978618	1021381	34	28274	6892
27	971746	993099	978646	1021353	33	28253	6900
28	971767	993092	978675	1021324	32	28232	6907
29	971787	993084	978703	1021296	31	28212	6915
30	971808	993076	978731	1021268	30	28191	6923
	Sine Compl.	Sine.	Tangent Compl.	Tang	58	Secans.	Secans.

31	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	971808	993076	978731	1021268	30	28191	1006923
31	971829	993068	978760	1021239	29	28170	6931
32	971849	993061	978788	1021211	28	28150	6938
33	971870	993053	978816	1021183	27	28129	6946
34	971890	993045	978845	1021154	26	28109	6954
35	971911	993037	978873	1021126	25	28089	6962
36	971931	993030	978901	1021098	24	28068	6969
37	971952	993022	978930	1021069	23	28047	6977
38	971973	993014	978958	1021041	22	28027	6985
39	971993	993006	978986	1021013	21	28006	6993
40	972013	992998	979015	1020984	20	27986	7001
41	972034	992991	979043	1020956	19	27965	7008
42	972054	992983	979071	1020928	18	27945	7016
43	972075	992975	979099	1020900	17	27924	7024
44	972095	992967	979128	1020871	16	27904	7032
45	972116	992959	979156	1020843	15	27883	7040
46	972136	992952	979184	1020815	14	27863	7047
47	972157	992944	979212	1020787	13	27842	7055
48	972177	992936	979241	1020758	12	27822	7063
49	972197	992928	979269	1020730	11	27802	7071
50	972218	992920	979297	1020702	10	27781	7079
51	972238	992912	979325	1020674	9	27761	7087
52	972258	992905	979353	1020646	8	27741	7094
53	972279	992897	979381	1020618	7	27720	7102
54	972299	992889	979410	1020589	6	27700	7110
55	972319	992881	979438	1020561	5	27680	7118
56	972340	992873	979466	1020533	4	27660	7126
57	972360	992865	979494	1020505	3	27639	7124
58	972380	992857	979522	1020477	2	27619	7142
59	972400	992849	979550	1020449	1	27599	7150
60	972420	992842	979578	1020421	0	27579	7157
	Sine Compl.	Sine.	Tangent Compl.	Tang.	58	Secans.	Secans.

32	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	972440	992842	979578	1020421	60	27579	1007157
1	972441	992834	979607	1020392	59	27558	7165
2	972461	992826	979635	1020364	58	27538	7173
3	972481	992818	979663	1020336	57	27518	7181
4	972501	992810	979691	1020308	56	27498	7189
5	972521	992802	979719	1020280	55	27478	7197
6	972542	992794	979747	1020252	54	27457	7205
7	972562	992786	979775	1020224	53	27437	7213
8	972582	992778	979803	1020196	52	27417	7221
9	972602	992770	979831	1020168	51	27397	7229
10	972622	992762	979850	1020140	50	27377	7237
11	972642	992754	979887	1020112	49	27357	7245
12	972662	992746	979915	1020084	48	27337	7253
13	972682	992738	979943	1020056	47	27317	7261
14	972702	992731	979971	1020028	46	27297	7268
15	972722	992723	979999	1020000	45	27277	7276
16	972742	992715	980027	1019972	44	27257	7284
17	972762	992707	980055	1019944	43	27237	7292
18	972782	992699	980083	1019916	42	27217	7300
19	972802	992691	980111	1019888	41	27197	7308
20	972822	992683	980139	1019860	40	27177	7316
21	972842	992675	980167	1019832	39	27157	7324
22	972862	992667	980195	1019804	38	27137	7332
23	972882	992659	980223	1019776	37	27117	7340
24	972902	992651	980251	1019748	36	27097	7348
25	972922	992643	980279	1019720	35	27077	7356
26	972942	992635	980307	1019692	34	27057	7364
27	972962	992627	980335	1019664	33	27037	7372
28	972981	992619	980362	1019637	32	27018	7380
29	973001	992610	980390	1019609	31	26998	7389
30	973021	992602	980418	1019581	30	26978	7397
	Sine Compl.	Sine.	Tangent Compl.	Tang	57	Secans.	Secans.

32	Sine.	Sine Compl.	Tang.	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	973021	992602	980418	1019581	30	26978	1007397
31	973041	992594	980446	1019553	29	26958	7405
32	973061	992586	980474	1019525	28	26938	7413
33	973081	992578	980502	1019497	27	26918	7421
34	973100	992570	980530	1019469	26	26899	7429
35	973120	992562	980558	1019441	25	26879	7437
36	973140	992554	980585	1019414	24	26859	7445
37	973160	992546	980613	1019386	23	26839	7453
38	973179	992538	980641	1019358	22	26820	7461
39	973199	992530	980669	1019330	21	26800	7469
40	973219	992522	980697	1019302	20	26780	7477
41	973239	992514	980724	1019275	19	26760	7485
42	973258	992505	980752	1019247	18	26741	7494
43	973278	992497	980780	1019219	17	26721	7502
44	973298	992489	980808	1019191	16	26701	7510
45	973317	992481	980836	1019163	15	26682	7518
46	973337	992473	980863	1019136	14	26662	7526
47	973356	992465	980891	1019108	13	26643	7534
48	973376	992457	980919	1019080	12	26623	7542
49	973396	992449	980947	1019052	11	26603	7550
50	973415	992440	980974	1019025	10	26584	7559
51	973435	992432	981002	1018997	9	26564	7567
52	973454	992424	981030	1018969	8	26545	7575
53	973474	992416	981057	1018942	7	26525	7583
54	973493	992408	981085	1018914	6	26506	7591
55	973513	992400	981113	1018886	5	26486	7599
56	973532	992391	981141	1018858	4	26467	7608
57	973552	992383	981168	1018831	3	26447	7616
58	973571	992375	981196	1018803	2	26428	7624
59	973591	992376	981224	1018775	1	26408	7632
60	973610	992359	981251	1018748	0	26389	7640
	Sine Compl.	Sine.	Tangent Compl.	Tang.	57	Secans.	Secans.

33	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Si. Co.
0	973610	992359	981251	1018748	60	26389	1007940
1	973630	992350	981279	1018720	59	26369	7649
2	973649	992342	981307	1018692	58	26350	7657
3	973669	992334	981334	1018665	57	26330	7665
4	973688	992326	981362	1018637	56	26311	7673
5	973707	992318	981389	1018610	55	26292	7681
6	973727	992309	981417	1018582	54	26272	7690
7	973746	992301	981445	1018554	53	26253	7698
8	973766	992293	981472	1018527	52	26233	7706
9	973785	992285	981500	1018499	51	26214	7714
10	973804	992276	981527	1018472	50	26195	7723
11	973824	992268	981555	1018444	49	26175	7731
12	973843	992260	981583	1018416	48	26156	7739
13	973862	992252	981610	1018389	47	26137	7747
14	973882	992243	981638	1018361	46	26117	7756
15	973901	992235	981665	1018334	45	26098	7764
16	973920	992227	981693	1018306	44	26079	7772
17	973939	992218	981720	1018279	43	26060	7781
18	973959	992210	981748	1018251	42	26040	7789
19	973978	992202	981775	1018224	41	26021	7797
20	973997	992194	981803	1018196	40	26002	7805
21	974016	992185	981830	1018169	39	25983	7814
22	974035	992177	981858	1018141	38	25964	7822
23	974055	992169	981885	1018114	37	25944	7830
24	974074	992160	981913	1018086	36	25925	7839
25	974093	992152	981940	1018059	35	25906	7847
26	974112	992144	981968	1018031	34	25887	7855
27	974131	992135	981995	1018004	33	25868	7864
28	974150	992127	982023	1017976	32	25849	7872
29	974169	992119	982050	1017949	31	25830	7880
30	974188	992110	982078	1017921	30	25811	7889
	Sine Compl.	Sine.	Tangent Compl.	Tang	56	Secans.	Secans.

33	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	974188	992110	982078	1017921	30	25811	1007889
31	974208	992102	982105	1017894	29	25791	7897
32	974227	992093	982133	1017866	28	25772	7906
33	974246	992085	982160	1017839	27	25753	7914
34	974265	992077	982188	1017811	26	25734	7922
35	974284	992068	982215	1017784	25	25715	7931
36	974303	992060	982242	1017757	24	25696	7939
37	974322	992052	982270	1017729	23	25677	7948
38	974341	992043	982297	1017702	22	25658	7956
39	974360	992035	982325	1017674	21	25639	7964
40	974379	992026	982352	1017647	20	25620	7973
41	974398	992018	982379	1017620	19	25601	7981
42	974417	992009	982407	1017592	18	25582	7990
43	974436	992001	982434	1017565	17	25563	7998
44	974454	991993	982461	1017538	16	25545	8006
45	974473	991984	982489	1017510	15	25526	8015
46	974492	991976	982516	1017483	14	25507	8023
47	974511	991967	982543	1017456	13	25488	8032
48	974530	991959	982571	1017428	12	25469	8040
49	974549	991950	982598	1017401	11	25450	8049
50	974568	991941	982625	1017374	10	25431	8057
51	974587	991933	982653	1017346	9	25412	8066
52	974605	991925	982680	1017319	8	25394	8074
53	974624	991916	982707	1017292	7	25375	8083
54	974643	991908	982735	1017264	6	25356	8091
55	974662	991899	982762	1017237	5	25337	8100
56	974681	991891	982789	1017210	4	25318	8108
57	974699	991882	982816	1017183	3	25300	8117
58	974718	991874	982844	1017155	2	25281	8125
59	974737	991865	982871	1017128	1	25262	8134
60	974756	991857	982898	1017101	0	25243	8142
	Sine Comp.	Sine.	Tangent Comp.	Tang	56 Secans.	Secans.	

34	Sine.	Sine Compl.	Tang	Tangent Compl.	Com. Ar. of Sine.	Com. Ar. of Si. Co.
0	974756	991857	982898	1017101	60 25243	1008143
1	974774	991848	982925	1017074	59 25225	8151
2	974793	991840	982953	1017046	58 25206	8159
3	974812	991831	982980	1017019	57 25187	8168
4	974830	991823	983007	1016992	56 25169	8176
5	974849	991814	983034	1016965	55 25150	8185
6	974868	991806	983062	1016937	54 25131	8193
7	974886	991797	983089	1016910	53 25113	8202
8	974905	991789	983116	1016883	52 25094	8210
9	974924	991780	983143	1016856	51 25075	8219
10	974942	991771	983170	1016829	50 25057	8228
11	974961	991763	983198	1016801	49 25038	8236
12	974980	991754	983225	1016774	48 25019	8245
13	974998	991746	983252	1016747	47 25001	8253
14	975017	991737	983279	1016720	46 24982	8262
15	975035	991729	983306	1016693	45 24964	8271
16	975054	961720	983333	1016666	44 24945	8279
17	975072	961711	983361	1016638	43 24927	8288
18	975091	991703	983388	1016611	42 24908	8296
19	975109	991694	983415	1016584	41 24890	8305
20	975128	991685	983442	1016557	40 24871	8314
21	975146	991677	983469	1016530	39 24853	8322
22	975165	991668	983496	1016503	38 24834	8331
23	975183	991660	983523	1016476	37 24816	8339
24	975202	991651	983550	1016449	36 24797	8348
25	975220	991642	983578	1016421	35 24779	8357
26	975239	991634	983605	1016394	34 24760	8365
27	975257	991625	983632	1016367	33 24742	8374
28	975276	991616	983659	1016340	32 24723	8383
29	975294	961608	983686	1016313	31 24705	8391
30	975312	991599	983713	1016286	30 24687	8400
	Sine Compl.	Sine.	Tangent Compl.	Tang	Secans.	Secans.

34	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	975312	991599	983713	1016286	30	24687	1008400
31	975331	991590	983740	1016259	29	24668	8409
32	975349	991582	983767	1016232	28	24650	8418
33	975367	991573	983794	1016205	27	24632	8426
34	975386	991564	983821	1016178	26	24613	8435
35	975404	991555	983848	1016151	25	24595	8444
36	975422	991547	983875	1016124	24	24577	8452
37	975441	991538	983902	1016097	23	24558	8461
38	975459	991529	983929	1016070	22	24540	8460
39	975477	991521	983956	1016043	21	24522	8478
40	975496	991512	983983	1016016	20	24503	8487
41	975514	991503	984010	1015989	19	24485	8496
42	975532	991494	984037	1015962	18	24467	8505
43	975550	991486	984064	1015935	17	24449	8513
44	975565	991477	984091	1015908	16	24430	8522
45	975587	991468	984118	1015881	15	24412	8531
46	975605	991459	984145	1015854	14	24394	8540
47	975623	991450	984172	1015827	13	24376	8549
48	975641	991442	984199	1015800	12	24358	8557
49	975659	991433	984226	1015773	11	24340	8566
50	975678	991424	984253	1015746	10	24321	8575
51	975696	991415	984280	1015719	9	24303	8584
52	975714	991407	984307	1015692	8	24285	8592
53	975732	991398	984334	1015665	7	24267	8601
54	975750	991389	984361	1015638	6	24249	8610
55	975768	991380	984388	1015611	5	24231	8619
56	975786	991371	984415	1015584	4	24213	8628
57	975804	991362	984441	1015558	3	24195	8637
58	975823	991354	984468	1015531	2	24176	8645
59	975841	991345	984495	1015504	1	24158	8654
60	975859	991336	984522	1015477	0	24140	8663
	Sine Comp.	Sine.	Tangent Comp.	Tang	55	Secans.	Secans.

35	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Si. Co.
0	975859	991336	984522	1015477	60	24140	1008663
1	975877	991327	984549	1015450	59	24122	8672
2	975895	991318	984576	1015423	58	24104	8681
3	975913	991309	984603	1015398	57	24086	8690
4	975931	991301	984630	1015369	56	24068	8698
5	975949	991292	984657	1015342	55	24050	8707
6	975967	991283	984683	1015316	54	24032	8716
7	975985	991274	984710	1015289	53	24014	8725
8	976003	991265	984737	1015262	52	23996	8734
9	976021	991256	984764	1015235	51	23978	8743
10	976038	991247	984791	1015208	50	23961	8752
11	976056	991238	984818	1015181	49	23943	8761
12	976074	991229	984844	1015155	48	23925	8770
13	976092	991220	984871	1015128	47	23907	8779
14	976110	991212	984898	1015101	46	23889	8787
15	976128	991203	984925	1015074	45	23871	8796
16	976146	991194	984952	1015047	44	23853	8805
17	976164	991185	984978	1015021	43	23835	8814
18	976182	991176	985005	1014994	42	23817	8823
19	976199	991167	985032	1014967	41	23800	8832
20	976217	991158	985059	1014940	40	23782	8841
21	976235	991149	985086	1014913	39	23764	8850
22	976253	991140	985112	1014887	38	23746	8859
23	976271	991131	985139	1014860	37	23728	8868
24	976288	991122	985166	1014833	36	23711	8877
25	976306	991113	985193	1014806	35	23693	8886
26	976324	991104	985219	1014780	34	23675	8895
27	976342	991095	985246	1014753	33	23657	8904
28	976359	991086	985273	1014726	32	23640	8913
29	976377	991077	985300	1014699	31	23622	8922
30	976395	991068	985326	1014673	30	23604	8931
	Sine Compl.	Sine.	Tangent Compl.	Tang	54	Secans.	Secans.

35	Sine.	Sine Compl.	Tang	Tangent Compl.		Com Ar of Sine.	Com. Ar. of Sine Co.
30	976395	991068	985326	1014673	30	23604	1008931
31	976413	991059	985353	1014646	29	23586	8940
32	976430	991050	985380	1014619	28	23569	8949
33	976448	991041	985406	1014593	27	23551	8958
34	976466	991032	985433	1014566	26	23533	8967
35	976482	991023	985460	1014539	25	23516	8976
36	976501	991014	985487	1014512	24	23498	8985
37	976519	991005	985513	1014486	23	23480	8994
38	976536	990996	985540	1014459	22	23463	9003
39	976554	990987	985567	1014432	21	23445	9012
40	976570	990978	985593	1014406	20	23428	9021
41	976589	990969	985620	1014379	19	23410	9030
42	976607	990960	985647	1014352	18	23392	9039
43	976624	990950	985673	1014326	17	23375	9046
44	976642	990941	985700	1014299	16	23357	9058
45	976659	990932	985727	1014272	15	23340	9067
46	976677	990923	985753	1014246	14	23322	9076
47	976694	990914	985780	1014219	13	23305	9085
48	976712	990905	985806	1014193	12	23287	9094
49	976729	990896	985833	1014166	11	23270	9103
50	976747	990887	985860	1014139	10	23252	9112
51	976764	990878	985886	1014113	9	23235	9121
52	976782	990869	985913	1014086	8	23217	9130
53	976799	990859	985940	1014059	7	23200	9140
54	976817	990850	985966	1014033	6	23182	9149
55	976834	990841	985993	1014006	5	23165	9158
56	976852	990832	986019	1013980	4	23147	9167
57	976869	990823	986046	1013953	3	23130	9176
58	976887	990814	986072	1013927	2	23112	9185
59	976904	990804	986099	1013900	1	23095	9195
60	976921	990795	986126	1013873	0	23078	9204
	Sine Compl	Sine.	Tangent Compl.	Tang	54	Secans.	Secans.

36	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Si. Co.
0	976921	990795	986126	1013873	60	23278	1009204
1	976939	990786	986152	1013847	59	23060	9213
2	976956	990777	986179	1013820	58	23043	9222
3	976973	990768	986205	1013794	57	23026	9231
4	976991	990759	986232	1013767	56	23008	9240
5	977008	990749	986258	1013741	55	22991	9250
6	977026	990740	986285	1013714	54	22973	9259
7	977043	990731	986311	1013688	53	22956	9268
8	977060	990722	986338	1013661	52	22939	9277
9	977077	990712	986365	1013635	51	22922	9287
10	977095	990703	986391	1013608	50	22904	9296
11	977112	990694	986418	1013581	49	22887	9305
12	977129	990685	986444	1013555	48	22870	9314
13	977147	990675	986471	1013528	47	22852	9324
14	977164	990666	986497	1013502	46	22835	9333
15	977181	990657	986524	1013475	45	22818	9342
16	977198	990648	986550	1013449	44	22801	9351
17	977215	990638	986577	1013422	43	22784	9361
18	977233	990629	986603	1013396	42	22766	9370
19	977250	990620	986629	1013370	41	22749	9379
20	977267	990611	986656	1013343	40	22732	9388
21	977285	990601	986682	1013317	39	22715	9398
22	977301	990592	986709	1013290	38	22698	9407
23	977319	990583	986735	1013264	37	22681	9416
24	977336	990573	986762	1013237	36	22663	9426
25	977353	990564	986788	1013211	35	22646	9435
26	977370	990555	986815	1013184	34	22629	9444
27	977387	990545	986841	1013158	33	22612	9454
28	977404	990536	986868	1013131	32	22595	9463
29	977421	990527	986894	1013105	31	22578	9472
30	977438	990517	986920	1013079	30	22561	9482
	Sine Compl.	Sine.	Tangent Compl.	Tang	53	Secans.	Secans.

36	Sine.	Sine Compl.	Tang	Tangent Compl.	30	Com Ar of Sine.	Cor. Ar. of Sine Co.
30	977438	990517	986920	1013079	30	22561	1009484
31	977455	990508	986947	1013052	29	22544	9491
32	977472	990499	986973	1013026	28	22527	9500
33	977489	990489	987000	1012999	27	22510	9510
34	977506	990480	987026	1012973	26	22493	9519
35	977523	990471	987056	1012947	25	22476	9528
36	977541	990461	987079	1012920	24	22458	9538
37	977558	990452	987105	1012894	23	22441	9547
38	977575	990442	987132	1012867	22	22424	9557
39	977591	990433	987158	1012841	21	22408	9566
40	977608	990424	987184	1012815	20	22391	9575
41	977625	990414	987211	1012788	19	22374	9585
42	977642	990405	987237	1012762	18	22357	9594
43	977659	990395	987263	1012736	17	22340	9604
44	977676	990386	987290	1012709	16	22323	9613
45	977693	990377	987316	1012683	15	22306	9622
46	977710	990367	987343	1012656	14	22289	9632
47	977727	990358	987369	1012630	13	22272	9641
48	977744	990348	987395	1012604	12	22255	9651
49	977761	990339	987422	1012577	11	22238	9660
50	977778	990329	987448	1012551	10	22221	9670
51	977795	990320	987474	1012525	9	22204	9679
52	977811	990310	987501	1012498	8	22188	9689
53	977828	990201	987527	1012472	7	22171	9698
54	977845	990291	987553	1012446	6	22154	9708
55	977862	990282	987579	1012420	5	22137	9717
56	977879	990272	987606	1012393	4	22120	9727
57	977895	990263	987632	1012367	3	22104	9736
58	977912	990253	987658	1012341	2	22087	9746
59	977929	990244	987685	1012314	1	22070	9755
60	977946	990234	987711	1012288	0	22053	9765
	Sine Compl	Sine.	Tangent Compl.	Tang	53	Secans.	Secans.

37	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	977940	990224	987711	1012288	60	22053	1009765
1	977963	990225	987737	1012262	59	22036	9774
2	977976	990215	987764	1012236	58	22020	9784
3	977996	990206	987790	1012209	57	21003	9793
4	978013	990196	987818	1012183	56	21986	9803
5	978030	990187	987842	1012157	55	21970	9812
6	978046	990177	987869	1012130	54	21953	9822
7	978063	990168	987895	1012104	53	21936	9831
8	978080	990158	987921	1012078	52	21919	9841
9	978096	990148	987947	1012052	51	21903	9851
10	978113	990139	987974	1012025	50	21886	9860
11	978130	990129	988000	1011999	49	21869	9870
12	978146	990120	988026	1011973	48	21853	9879
13	978163	990110	988052	1011947	47	21836	9889
14	978180	990101	988079	1011921	46	21819	9898
15	978196	990091	988105	1011894	45	21803	9908
16	978213	990081	988131	1011868	44	21786	9918
17	978229	990072	988157	1011842	43	21770	9927
18	978246	990062	988183	1011816	42	21753	9937
19	978263	990052	988210	1011789	41	21736	9947
20	978279	990043	988236	1011763	40	21720	9956
21	978296	990033	988262	1011737	39	21703	9966
22	978312	990024	988288	1011711	38	21687	9975
23	978329	990014	988314	1011685	37	21670	9985
24	978345	990004	988341	1011658	36	21654	9995
25	978362	989995	988367	1011632	35	21637	10004
26	978378	989985	988393	1011606	34	21621	10014
27	978395	989975	988419	1011580	33	21604	10024
28	978411	989966	988445	1011554	32	21588	10033
29	978428	989956	988471	1011528	31	21571	10043
30	978444	989946	988498	1011501	30	21555	10053
	Sine Compl.	Sine.	Tangent Compl.	Tang	52	Secans.	Sec ants.

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Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30 978444	989946	988498	1011501	30	21555	1010053
31 978461	989936	988524	1011475	29	21538	10063
32 978477	989927	988550	1011449	28	21522	10072
33 978474	989917	988576	1011423	27	21505	10082
34 978510	989907	988602	1011397	26	21489	10092
35 978526	989898	988628	1011371	25	21473	10101
36 978543	989888	988654	1011345	24	21456	10111
37 978559	989878	988681	1011318	23	21440	10121
38 978576	989868	988707	1011292	22	21423	10131
39 978592	989859	988733	1011266	21	21407	10140
40 978608	989849	988759	1011240	20	21391	10150
41 978625	989839	988785	1011214	19	21374	10160
42 978641	989829	988811	1011188	18	21358	10170
43 978657	989820	988837	1011162	17	21342	10179
44 978674	989810	988863	1011136	16	21325	10189
45 978690	989800	988889	1011110	15	21309	10199
46 978706	989790	988916	1011083	14	21293	10209
47 978723	989781	988942	1011057	13	21276	10218
48 978739	989771	988968	1011031	12	21260	10228
49 978755	989761	988994	1011005	11	21244	10238
50 978772	989751	988020	1010979	10	21227	10248
51 978788	989741	989046	1010953	9	21211	10258
52 978804	989731	989072	1010927	8	21195	10268
53 978820	989722	989098	1010901	7	21179	10277
54 978837	989712	989124	1010875	6	21162	10287
55 978853	989702	989150	1010849	5	21146	10297
56 978869	989692	989176	1010823	4	21130	10307
57 978885	989682	989202	1010797	3	21114	10317
58 978901	989672	989228	1010771	2	21098	10327
59 978918	989663	989254	1010745	1	21081	10336
60 978934	989653	989280	1010719	0	21065	10346
Sine. Compl.	Sine.	Tangent Compl.	Tang	52	Secans.	Secans.

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38	Sine.	Sine Compl.	Tang.	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	978934	989652	989280	1010719	60	21065	1010346
1	978950	989643	989307	1010692	59	21049	10356
2	978966	989633	989333	1010666	58	21033	10366
3	978982	989623	989359	1010640	57	21017	10376
4	978998	989613	989385	1010614	56	21001	10386
5	979014	989603	989411	1010588	55	20985	10396
6	979031	989593	989437	1010562	54	20968	10406
7	979047	989583	989463	1010536	53	20952	10416
8	979063	989574	989489	1010510	52	20936	10425
9	979079	989564	989515	1010484	51	20920	10435
10	979095	989554	989541	1010458	50	20904	10445
11	979111	989544	989567	1010432	49	20888	10455
12	979127	989534	989593	1010406	48	20872	10465
13	979143	989524	989619	1010380	47	20856	10475
14	979159	989514	989645	1010354	46	20840	10485
15	979175	989504	989671	1010328	45	20824	10495
16	979191	989494	989697	1010302	44	20808	10505
17	979207	989484	989723	1010276	43	20792	10515
18	979223	989474	989749	1010250	42	20776	10525
19	979239	989464	989775	1010224	41	20760	10535
20	979255	989454	989801	1010198	40	20744	10545
21	979271	989444	989827	1010173	39	20728	10555
22	979287	989434	989852	1010147	38	20712	10565
23	979303	989424	989878	1010121	37	20696	10575
24	979319	989414	989904	1010095	36	20680	10585
25	979335	989404	989930	1010069	35	20664	10595
26	979351	989394	989956	1010043	34	20648	10605
27	979367	989384	989982	1010017	33	20632	10615
28	979383	989374	990008	1009991	32	20616	10625
29	979399	989364	990034	1009965	31	20600	10635
30	979417	989354	990060	1009939	30	20585	10645
	Sine Compl.	Sine.	Tangent Compl.	Tang.	51	Secans.	Secans.

38	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	979414	989354	990069	1009939	30	20585	1010645
31	979430	989344	990086	1009913	29	20569	10655
32	979446	989334	990112	1009889	28	20553	10665
33	979462	989324	990138	1009861	27	20537	10675
34	979478	989314	990164	1009835	26	20521	10685
35	979494	989304	990190	1009809	25	20505	10695
36	979510	989294	990216	1009783	24	20489	10705
37	979525	989283	990241	1009758	23	20474	10716
38	979541	989273	990267	1009732	22	20458	10726
39	979557	989263	990293	1009706	21	20442	10736
40	979573	989253	990319	1009680	20	20426	10746
41	979589	989243	990345	1009654	19	20410	10756
42	979604	989233	990371	1009628	18	20395	10766
43	979620	989223	990397	1009602	17	20379	10776
44	979636	989213	990423	1009576	16	20363	10786
45	979652	989203	990449	1009550	15	20347	10796
46	979667	989192	990474	1009525	14	20332	10807
47	979683	989182	990500	1009499	13	20316	10817
48	979699	989172	990526	1009473	12	20300	10827
49	979715	989162	990552	1009447	11	20284	10837
50	979730	989152	990578	1009421	10	20269	10847
51	979746	989142	990604	1009395	9	20253	10857
52	979762	989131	990630	1009369	8	20237	10868
53	979777	989121	990656	1009343	7	20222	10878
54	979793	989111	990681	1009318	6	20206	10888
55	979809	989101	990707	1009292	5	20190	10898
56	979824	989091	990733	1009266	4	20175	10908
57	979840	989080	990759	1009240	3	20159	10919
58	979855	989070	990785	1009214	2	20144	10929
59	979871	989060	990811	1009188	1	20128	10939
60	979887	989050	990836	1009163	0	20112	10949
	Sine Compl.	Sine.	Tangent Compl.	Tang	51	Secans.	Secans.

39	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	979887	989050	990826	1009*63	60	20112	1010949
1	979902	989040	990862	1009137	59	20097	10959
2	979918	989029	990888	1009111	58	20081	10970
3	979932	989019	990914	1009085	57	20068	10980
4	979949	989009	990940	1009059	56	20050	10990
5	979965	988999	990966	1009033	55	20034	11000
6	979980	988988	990991	1009008	54	20019	11011
7	979996	988978	991017	1008982	53	20003	11021
8	980011	988968	991043	1008956	52	19988	11031
9	980027	988957	991069	1008930	51	19972	11042
10	980042	988947	991095	1008904	50	19957	11052
11	980058	988937	991120	1008879	49	19941	11062
12	980073	988927	991146	1008853	48	19926	11072
13	980089	988916	991172	1008827	47	19910	11083
14	980104	988906	991198	1008801	46	19895	11093
15	980120	988896	991224	1008775	45	19879	11103
16	980135	988885	991249	1008750	44	19864	11114
17	980151	988875	991275	1008724	43	19848	11124
18	980166	988865	991301	1008698	42	19833	11134
19	980181	988854	991327	1008672	41	19818	11144
20	980197	988844	991352	1008647	40	19802	11154
21	980212	988834	991378	1008621	39	19787	11164
22	980228	988823	991404	1008595	38	19771	11174
23	980243	988813	991430	1008569	37	19756	11184
24	980258	988802	991455	1008544	36	19741	11194
25	980274	988792	991481	1008518	35	19725	11204
26	980289	988782	991507	1008492	34	19710	11214
27	980305	988771	991533	1008466	33	19694	11224
28	980320	988761	991558	1008441	32	19679	11234
29	980335	988751	991584	1008415	31	19664	11244
30	980351	988740	991610	1008389	30	19648	11254
	Sine Compl.	Sine.	Tangent Compl.	Tang	50	Secans.	Secans.

Sine.	Sine Comp.	Tang	Tangent Compl.	Com. Ar. of Sine.	Com. Ar. of Sine Co.
30 980351	988740	991610	1008389	30 19648	1011259
31 980366	988720	991636	1008363	29 19633	11269
32 980381	988719	991661	1008338	28 19618	11280
33 980396	988709	991687	1008312	27 19603	11290
34 980412	988698	991713	1008286	26 19587	11301
35 980427	988688	991739	1008260	25 19572	11311
36 980442	988678	991764	1008235	24 19557	11321
37 980458	988667	991790	1008209	23 19541	11332
38 980473	988657	991816	1008183	22 19526	11342
39 980488	988646	991841	1008158	21 19511	11353
40 980503	988636	991867	1008132	20 19496	11363
41 980519	988625	991893	1008106	19 19480	11374
42 980534	988615	991919	1008080	18 19465	11384
43 980549	988604	991944	1008055	17 19450	11395
44 980564	988594	991970	1008029	16 19435	11405
45 980579	988583	991996	1008003	15 19420	11416
46 980595	988573	992021	1007978	14 19404	11426
47 980610	988562	992047	1007952	13 19389	11437
48 980625	988552	992073	1007926	12 19374	11447
49 980640	988541	992098	1007901	11 19359	11458
50 980655	988531	992124	1007875	10 19344	11468
51 980670	988520	992150	1007849	9 19329	11479
52 980686	988510	992176	1007823	8 19313	11490
53 980701	988499	992201	1007798	7 19248	11500
54 980716	988488	992227	1007772	6 19283	11511
55 980731	988478	992253	1007746	5 19268	11521
56 980746	988467	992278	1007721	4 19253	11532
57 980761	988457	992304	1007695	3 19238	11542
58 980776	988446	992330	1007669	2 19223	11553
59 980791	988435	992352	1007644	1 19208	11564
60 980806	988425	992381	1007618	0 19193	11575
Sine Compl.	Sine.	Tangent Compl.	Tang	Secans.	Secans.

40	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of St. Co.
0	980806	988425	992381	1007618	60	19193	1011574
1	980821	988414	992407	1007592	59	19178	11585
2	980836	988404	992432	1007567	58	19163	11595
3	980851	988393	992458	1007541	57	19148	11606
4	980866	988382	992483	1007516	56	19133	11617
5	980881	988372	992509	1007490	55	19118	11627
6	980896	988361	992535	1007464	54	19103	11638
7	980911	988351	992560	1007439	53	19088	11648
8	980926	988340	992586	1007413	52	19073	11659
9	980941	988329	992612	1007387	51	19058	11670
10	980956	988319	992637	1007362	50	19043	11680
11	980971	988308	992663	1007336	49	19028	11691
12	980986	988297	992689	1007310	48	19013	11702
13	981001	988287	992714	1007285	47	18998	11712
14	981016	988276	992740	1007259	46	18983	11723
15	981031	988265	992765	1007234	45	18968	11734
16	981046	988254	992791	1007208	44	18953	11745
17	981061	988244	992817	1007182	43	18938	11755
18	981076	988233	992842	1007157	42	18923	11766
19	981091	988222	992868	1007131	41	18908	11777
20	981106	988212	992893	1007106	40	18893	11787
21	981120	988201	992919	1007080	39	18879	11798
22	981135	988190	992945	1007054	38	18864	11809
23	981150	988179	992970	1007029	37	18849	11820
24	981165	988169	992996	1007003	36	18834	11830
25	981180	988158	993021	1006978	35	18819	11841
26	981195	988147	993047	1006952	34	18804	11852
27	981210	988136	993073	1006926	33	18789	11863
28	981224	988126	993098	1006901	32	18775	11873
29	981239	988115	993124	1006875	31	18760	11884
30	981254	988104	993149	1006850	30	18745	11895
	Sine Compl.	Sine	Tangent Compl.	Tang	49	Secans.	Secans.

	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
40	981254	988104	993149	1006850	30	18745	1011895
31	981269	988093	993175	1006824	29	18730	11906
32	981284	988082	993201	1006798	28	18715	11917
33	981298	988072	993226	1006773	27	18701	11927
34	981313	988061	993252	1006747	26	18686	11938
35	981328	988050	993277	1006722	25	18671	11949
36	981343	988039	993303	1006696	24	18656	11960
37	981357	988028	993328	1006671	23	18642	11971
38	981372	988018	993354	1006645	22	18627	11981
39	981387	988007	993380	1006619	21	18612	11962
40	981401	987996	993405	1006594	20	18598	12003
41	981416	987985	993431	1006568	19	18583	12014
42	981431	987974	993456	1006543	18	18568	12025
43	981446	987963	993482	1006517	17	18554	12036
44	981460	987952	993507	1006492	16	18539	12047
45	981475	987941	993533	1006466	15	18524	12058
46	981489	987931	993558	1006441	14	18510	12068
47	981504	987920	993584	1006415	13	18495	12079
48	981519	987909	993609	1006390	12	18480	12090
49	981533	987898	993635	1006364	11	18466	12101
50	981548	987887	993661	1006338	10	18451	12112
51	981563	987876	993686	1006312	9	18436	12123
52	981577	987865	993712	1006287	8	18422	12134
53	981592	987854	993737	1006262	7	18407	12145
54	981606	987843	993763	1006236	6	18393	12156
55	981621	987832	993788	1006211	5	18378	12167
56	981636	987821	993814	1006185	4	18363	12178
57	981650	987810	993839	1006160	3	18349	12189
58	981665	987799	993865	1006134	2	18334	12200
59	981679	987788	993890	1006109	1	18320	12211
60	981694	987777	993916	1006083	0	18305	12222
	Sine Compl.	Sine.	Tangent Compl.	Tang.	49	Secans.	Secans.

41	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	981694	987777	993916	1006083	60	18305	1012222
1	981708	987767	993941	1006058	59	18291	12233
2	981723	987756	993967	1006032	58	18276	12243
3	981737	987745	993992	1006007	57	18262	12254
4	981752	987734	994018	1005981	56	18247	12265
5	981766	987723	994043	1005956	55	18233	12277
6	981781	987711	994069	1005930	54	18218	12288
7	981795	987700	994094	1005905	53	18204	12299
8	981810	987689	994120	1005879	52	18189	12310
9	981824	987678	994145	1005854	51	18175	12321
10	981839	987667	994171	1005828	50	18160	12332
11	981853	987656	994196	1005803	49	18146	12343
12	981868	987645	994222	1005777	48	18131	12354
13	981882	987634	994247	1005752	47	18117	12365
14	981896	987623	994273	1005726	46	18103	12376
15	981911	987612	994298	1005701	45	18088	12387
16	981925	987601	994324	1005675	44	18074	12398
17	981940	987590	994349	1005650	43	18059	12409
18	981954	987579	994375	1005624	42	18045	12420
19	981968	987568	994400	1005599	41	18031	12431
20	981983	987557	994426	1005573	40	18016	12442
21	981997	987545	994451	1005548	39	18002	12454
22	982011	987534	994477	1005522	38	17988	12465
23	982026	987523	994502	1005497	37	17973	12476
24	982040	987512	994528	1005471	36	17959	12487
25	982054	987501	994553	1005446	35	17945	12498
26	982069	987490	994579	1005421	34	17930	12509
27	982083	987479	994604	1005395	33	17916	12520
28	982097	987468	994629	1005370	32	17902	12532
29	982112	987456	994655	1005344	31	17887	12543
30	982126	987445	994680	1005319	30	17873	12554
	Sine Compl.	Sine.	Tangent Compl.	Tang	48	Secans.	Secans.

41	Sine.	Sine Comp.	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	982126	987445	994680	1005319	30	17873	1012554
31	982140	987434	994706	1005293	29	17859	12565
32	982155	987423	994731	1005268	28	17845	12576
33	982169	987412	994757	1005242	27	17830	12587
34	982183	987400	994782	1005217	26	17816	12599
35	982197	987389	994808	1005191	25	17802	12610
36	982211	987378	994833	1005166	24	17788	12621
37	982226	987367	994858	1005141	23	17773	12632
38	982240	987355	994884	1005115	22	17759	12644
39	982254	987344	994909	1005090	21	17745	12655
40	982268	987333	994935	1005064	20	17731	12666
41	982283	987322	994960	1005039	19	17716	12677
42	982297	987311	994986	1005013	18	17702	12688
43	982311	987299	995011	1004988	17	17684	12700
44	982325	987288	995037	1004962	16	17678	12711
45	982339	987277	995062	1004937	15	17660	12722
46	982353	987265	995087	1004912	14	17646	12734
47	982368	987254	995113	1004886	13	17632	12745
48	982382	987243	995138	1004861	12	17617	12756
49	982396	987232	995164	1004835	11	17603	12767
50	982410	987220	995189	1004810	10	17589	12779
51	982424	987209	995215	1004784	9	17575	12790
52	982438	987198	995249	1004759	8	17561	12801
53	982452	987186	995265	1004734	7	17547	12813
54	982466	987175	995291	1004708	6	17533	12824
55	982480	987164	995316	1004683	5	17519	12835
56	982494	987152	995342	1004657	4	17505	12847
57	982508	987141	995367	1004632	3	17491	12858
58	982523	987130	995392	1004607	2	17476	12869
59	982537	987118	995418	1004581	1	17462	12881
60	982551	987107	995443	1004556	0	17448	12892
	Sine Compl.	Sine.	Tangent Compl.	Tang	48	Secans.	Secans.

42	Sine.	Sine Comp	Tang	Tangent Compl.		Com. Ar. of Sine.	Com. Ar. of Sine Co.
0	982551	987107	995443	1004556	60	17448	1012892
1	982565	987095	995469	1004530	59	17434	12904
2	982579	987084	995494	1004505	58	17420	12915
3	982593	987073	995519	1004480	57	17406	12926
4	982607	987061	995545	1004454	56	17392	12938
5	982621	987050	995570	1004429	55	17378	12949
6	982635	987038	995596	1004403	54	17364	12961
7	982649	987027	995621	1004378	53	17350	12972
8	982663	987016	995646	1004353	52	17336	12983
9	982677	987004	995672	1004323	51	17322	12995
10	982690	986902	995697	1004302	50	17309	13006
11	982704	986981	995723	1004276	49	17295	13018
12	982718	986970	995748	1004251	48	17281	13029
13	982732	986958	995773	1004226	47	17267	13041
14	982746	986947	995799	1004200	46	17253	13052
15	982760	986935	995824	1004175	45	17239	13064
16	982774	986924	995850	1004149	44	17225	13075
17	982788	986913	995875	1004124	43	17211	13086
18	982802	986901	995900	1004099	42	17197	13098
19	982816	986890	995926	1004073	41	17183	13109
20	982830	986878	995951	1004048	40	17169	13121
21	982843	986867	995976	1004023	39	17156	13133
22	982857	986855	996002	1003997	38	17142	13144
23	982871	986843	996027	1003972	37	17128	13156
24	982885	986832	996053	1003946	36	17114	13167
25	982899	986820	996078	1003921	35	17100	13179
26	982913	986809	996103	1003896	34	17086	13190
27	982926	986797	996129	1003870	33	17073	13202
28	982940	986786	996154	1003845	32	17059	13213
29	982954	986774	996179	1003820	31	17045	13225
30	982968	986763	996205	1003794	30	17031	13236
	Sine Compl.	Sine.	Tangent Compl.	Tang	47	Secans.	Secans.

42	Sine.	Sine Comp.	Tang	Tangent Compl.	Com. Ar. of Sine.	Com. Ar. of Sine Co.
30	982968	986763	996205	1003794	30	17031 1013236
31	982982	986751	996230	1003769	29	17017 13248
32	982995	986739	996255	1003744	28	17004 13260
33	983009	986728	996281	1003718	27	16990 13271
34	983023	986716	996306	1003693	26	16976 13283
35	983037	986705	996332	1003667	25	16962 13294
36	983050	986693	996357	1003642	24	16949 13306
37	983064	986681	996382	1003617	23	16935 13318
38	983078	986670	996408	1003591	22	16921 13329
39	983092	986658	996433	1003566	21	16907 13341
40	983105	986646	996458	1003541	20	16894 13353
41	983119	986635	996484	1003515	19	16880 13364
42	983133	986623	996509	1003490	18	16866 13376
43	983146	986612	996534	1003465	17	16853 13387
44	983160	986600	996560	1003439	16	16839 13399
45	983174	986588	996585	1003414	15	16825 13411
46	983187	986577	996610	1003389	14	16812 13423
47	983201	986565	996636	1003363	13	16798 13434
48	983215	986553	996661	1003338	12	16784 13446
49	983228	986541	996686	1003313	11	16771 13458
50	983242	986530	996712	1003287	10	16757 13469
51	983256	986518	996737	1003262	9	16743 13481
52	983269	986506	996762	1003237	8	16730 13493
53	983283	986495	996788	1003211	7	16716 13504
54	983296	986483	996813	1003186	6	16703 13516
55	983310	986471	996838	1003161	5	16689 13528
56	983324	986459	996864	1003135	4	16675 13540
57	983337	986448	996889	1003110	3	16662 13551
58	983351	986436	996914	1003085	2	16648 13563
59	983364	986424	996940	1003059	1	16635 13575
60	983378	986412	996965	1003034	0	16621 13587
	Sine Compl.	Sine.	Tangent Compl.	Tang	47	Secans. Secans.

43	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar of Sine.	Com. Ar. of Si. Co.
0	983378	986412	996965	1003034	60	16621	1013579
1	983391	986400	996990	1003009	59	16608	13599
2	983405	986389	997016	1002983	58	16594	13610
3	983418	986377	997041	1002958	57	16581	13622
4	983432	986365	997066	1002933	56	16567	13634
5	983445	986353	997092	1002907	55	16554	13646
6	983459	986341	997117	1002882	54	16540	13658
7	983472	986330	997142	1002857	53	16527	13669
8	983486	986318	997168	1002831	52	16513	13681
9	983499	986306	997193	1002806	51	16500	13693
10	983513	986296	997218	1002781	50	16486	13705
11	983526	986282	997244	1002755	49	16473	13717
12	983540	986270	997269	1002730	48	16459	13729
13	983553	986259	997294	1002705	47	16446	13740
14	983567	986247	997320	1002679	46	16432	13752
15	983580	986235	997345	1002654	45	16419	13764
16	983594	986223	997370	1002629	44	16405	13776
17	983607	986211	997396	1002603	43	16392	13788
18	983620	986199	997421	1002578	42	16379	13800
19	983634	986187	997446	1002553	41	16365	13812
20	983647	986175	997471	1002528	40	16352	13824
21	983661	986163	997497	1002502	39	16338	13836
22	983674	986151	997522	1002477	38	16325	13848
23	983687	986139	997547	1002452	37	16312	13860
24	983701	986148	997573	1002426	36	16298	13871
25	983714	986116	997598	1002401	35	16285	13883
26	983727	986104	997623	1002376	34	16272	13895
27	983741	986092	997645	1002350	33	16258	13907
28	983754	986080	997674	1002325	32	16245	13919
29	983767	986068	997699	1002300	31	16232	13931
30	983781	986056	997725	1002275	30	16218	13943
	Sine Compl.	Sine	Tangent Compl.	Tang	46	Secans.	Secans.

43	Sine.	Sine Compl.	Tang	Tangen Compl.		Com Ar of Sine.	Com. Ar. of Sine Co.
30	983781	986056	997725	1002275	30	16218	1013943
31	983794	986044	997750	1002249	29	16205	13953
32	983807	986032	997775	1002224	28	16192	13967
33	983821	986020	997800	1002199	27	16178	13979
34	983834	986008	997826	1002173	26	16165	13991
35	983847	985996	997851	1002148	25	16152	14003
36	983860	985984	997876	1002123	24	16139	14015
37	983874	985972	997902	1002097	23	16125	14027
38	983887	985960	997927	1002072	22	16112	14039
39	983900	985938	997952	1002047	21	16099	14051
40	983913	985945	997977	1002022	20	16086	14064
41	983927	985923	998003	1001996	19	16072	14076
42	983940	985911	998028	1001971	18	16059	14088
43	983953	985899	998053	1001946	17	16046	14100
44	983966	985887	998079	1001920	16	16033	14112
45	983980	985875	998104	1001895	15	16019	14124
46	983993	985863	998129	1001870	14	16006	14136
47	984006	985851	998155	1001844	13	15993	14148
48	984019	985839	998180	1001819	12	15980	14160
49	984032	985827	998205	1001794	11	15967	14172
50	984045	985815	998230	1001769	10	15954	14184
51	984059	985802	998256	1001743	9	15940	14197
52	984072	985790	998281	1001718	8	15927	14209
53	984085	985778	998306	1001693	7	15914	14221
54	984098	985768	998332	1001667	6	15901	14233
55	984111	985754	998357	1001642	5	15888	14245
56	984124	985742	998382	1001617	4	15875	14257
57	984137	985729	998407	1001592	3	15862	14270
58	984150	985717	998433	1001566	2	15849	14282
59	984164	985705	998458	1001541	1	15835	14294
60	984177	985693	998483	1001516	0	15822	14306
	Sine Compl.	Tangent Compl.	Sine.	Tang	46	Secans.	Secans.

44	Sine.	Sine Compl.	Tang	Tangent Compl.		Com. Ar of Sine	Com. Ar of Si. Co.
0	984177	985693	998482	1001516	60	15822	14306
1	984190	985681	998509	1001491	59	15809	14318
2	984203	985669	998534	1001465	58	15796	14331
3	984216	985656	998559	1001446	57	15783	14343
4	984229	985644	998584	1001415	56	15770	14355
5	984242	985632	998610	1001389	55	15757	14367
6	984255	985620	998635	1001364	54	15744	14379
7	984268	985607	998660	1001339	53	15731	14392
8	984281	985595	998685	1001314	52	15718	14404
9	984294	985583	998711	1001288	51	15705	14416
10	984307	985571	998736	1001263	50	15692	14428
11	984320	985558	998761	1001238	49	15679	14441
12	984333	985546	998787	1001212	48	15666	14453
13	984346	985534	998812	1001187	47	15653	14465
14	984359	985521	998837	1001162	46	15640	14478
15	984372	985509	998862	1001137	45	15627	14490
16	984385	985497	998888	1001111	44	15614	14502
17	984398	985484	998913	1001086	43	15601	14515
18	984411	985472	998938	1001061	42	15588	14527
19	984424	985460	998963	1001036	41	15575	14539
20	984437	985447	998989	1001010	40	15562	14552
21	984450	985435	999014	1000985	39	15549	14564
22	984463	985423	999039	1000960	38	15536	14576
23	984476	985410	999065	1000934	37	15523	14589
24	984488	985398	999090	1000909	36	15511	14601
25	984501	985386	999115	1000884	35	15498	14613
26	984514	985373	999140	1000859	34	15485	14626
27	984527	985361	999166	1000833	33	15472	14638
28	984540	985349	999191	1000808	32	15459	14650
29	984553	985336	999216	1000783	31	15446	14663
30	984566	985324	999241	1000758	30	15433	14675
	Sine Compl.	Sine.	Tangent Compl.	Tang	45	Secans.	Secans.

44	Sine.	Sine Compl.	Tang	Tangent Compl.		Com Ar of Sine.	Com. Ar of Sine Co.
30	984566	985324	999241	1000758	30	15433	1014675
31	984579	985311	999267	1000732	29	15420	14688
32	984591	985299	999292	1000707	28	15408	14700
33	984604	985286	999317	1000682	27	15395	14713
34	984617	985274	999343	1000656	26	15382	14725
35	984630	985262	999368	1000631	25	15369	14737
36	984643	985249	999393	1000606	24	15356	14750
37	984655	985237	999418	1000581	23	15344	14762
38	984668	985224	999444	1000555	22	15331	14775
39	984681	985212	999469	1000530	21	15318	14787
40	984694	985199	999494	1000505	20	15305	14800
41	984707	985187	999519	1000480	19	15292	14812
42	984719	985174	999545	1000454	18	15280	14825
43	984732	985162	999570	1000429	17	15267	14837
44	984745	985149	999595	1000404	16	15254	14850
45	984758	985137	999621	1000379	15	15241	14862
46	984770	985124	999646	1000353	14	15229	14875
47	984783	985112	999671	1000328	13	15216	14887
48	984796	985099	999696	1000303	12	15203	14900
49	984809	985087	999722	1000277	11	15190	14912
50	984821	985074	999747	1000252	10	15178	14925
51	984834	985061	999772	1000227	9	15165	14938
52	984847	985049	999797	1000202	8	15152	14950
53	984859	985036	999823	1000176	7	15140	14963
54	984872	985024	999848	1000151	6	15127	14975
55	984885	985011	999873	1000126	5	15114	14988
56	984897	984998	999898	1000101	4	15102	15001
57	984910	984986	999924	1000075	3	15089	15013
58	984923	984973	999949	1000050	2	15076	15026
59	984935	984961	999974	1000025	1	15064	15038
60	984948	984948	9000000	1000000	0	15051	15051
	Sine Compl.	Tangent Compl.	Sine.	Tang	45	Secans.	Secans.

How to examine the Truth of the foregoing Canon of Sines and Tangents.

TO the Sine of any Degree and Minute add its Complement Arithmetical, and the Sum of them shall be 999999, or rather 1000000. Also if to the Tangent of any Degree and Minute, you add its Complement, the Sum shall be 1999999; or rather 2000000; but an Unite's Difference, in the last place, is not at all material. Thus if you doubt of the Truth of any Number in the Canon, you may by this Rule easily discover it; or if any Figure do not appear, this Rule will tell you what Figure it should be.

A
CHILIAD
OR THE
LOGARITHMS
OF

Absolute Numbers, from 1 to 10000.

Chilias. i.

Num	Logar.	Num	Logar.	Num	Logar.	Num	Logar.
1	00000	34	153147	67	182607	100	200000
2	30103	35	154406	68	183259	101	200432
3	47712	36	155630	69	183884	102	200260
4	60206	37	156820	70	184509	103	201283
5	69897	38	157978	71	185125	104	201703
6	77815	39	159106	72	185733	105	202118
7	84509	40	160206	73	186332	106	202530
8	90309	41	161278	74	186923	107	202938
9	95424	42	162324	75	187506	108	203342
10	100000	43	163346	76	188081	109	203742
11	104139	44	164345	77	188649	110	204139
12	107918	45	165321	78	189209	111	204532
13	111394	46	166276	79	189762	112	204921
14	114612	47	167209	80	190309	113	205307
15	117609	48	168124	81	190848	114	205690
16	120412	49	169019	82	191381	115	206069
17	123044	50	169897	83	191907	116	206445
18	125527	51	170757	84	192427	117	206818
19	127875	52	171600	85	192941	118	207188
20	130103	53	172427	86	193449	119	207554
22	132221	54	173239	87	193951	120	207918
22	134242	55	174036	88	194448	121	208278
23	136172	56	174818	89	194939	122	208635
24	138021	57	175587	90	195424	123	208990
25	139794	58	176342	91	195904	124	209342
26	141497	59	177085	92	196378	125	209691
27	143136	60	177815	93	196848	126	210037
28	144715	61	178532	94	197312	127	210387
29	146239	62	179239	95	197772	128	210720
30	147712	63	179934	96	198227	129	211058
31	149136	64	180618	97	198677	130	211394
32	150515	65	181291	98	199122	131	211727
33	151851	66	181954	99	209563	132	212057

Chilias r.

Num.	Logar.	Num.	Logar.	Num.	Logar.	Num.	Logar.
133	212385	166	222010	199	229885	232	236548
134	212710	167	222271	200	230103	233	236735
135	213033	168	222530	201	230319	234	236921
136	213353	169	222788	202	230535	235	237106
137	213672	170	223044	203	230749	236	237291
138	213987	171	223299	204	230963	237	237474
139	214301	172	223552	205	231175	238	237657
140	214612	173	223804	206	231386	239	237839
141	214921	174	224054	207	231597	240	238021
142	215228	175	224303	208	231806	241	238208
143	215533	176	224551	209	232014	242	238381
144	215836	177	224797	210	232221	243	238560
145	216136	178	225042	211	232428	244	238738
146	216435	179	225285	212	232633	245	238916
147	216731	170	225527	213	232837	246	239092
148	217026	181	225767	214	233041	247	239269
149	217318	182	226007	215	233243	248	239445
150	217609	183	226245	216	233445	249	239619
151	217897	184	226481	217	233645	250	239794
152	218184	185	226817	218	233845	251	239967
153	218469	186	226951	219	234044	252	240142
154	218752	187	227184	220	234242	253	240317
155	219033	188	227415	221	234439	254	240488
156	219312	189	227646	222	234635	255	240659
157	219589	190	227875	223	234830	256	240829
158	219865	191	228103	224	235024	257	240899
159	220139	192	228330	225	235218	258	241100
160	220412	193	228555	226	235410	259	241300
161	220682	194	228780	227	235602	260	241499
162	220951	195	229003	228	235793	261	241660
163	221018	196	229225	229	235983	262	241821
164	221484	197	229446	230	236172	263	241990
165	221748	198	229666	231	236361	264	242160

Chilias. I.

Num	Logar.	Num	Logar.	Num	Logar.	Num	Logar.
265	242324	298	247421	331	251982	364	256110
266	242488	299	247565	332	252113	365	256229
267	242651	300	247712	333	252244	366	256348
268	242813	301	247856	334	252374	367	256466
269	242975	302	248000	335	252504	368	256584
270	243136	303	248144	336	252633	369	256702
271	243296	304	248287	337	252762	370	256820
272	243456	305	248429	338	252891	371	256937
273	243616	306	248572	339	253019	372	257054
274	243775	307	248713	340	253147	373	257170
275	243933	308	248855	341	253275	374	257287
276	244090	309	248995	342	253402	375	257403
277	244247	310	249136	343	253529	376	257518
278	244404	311	249276	344	253655	377	257634
279	244560	312	249415	345	253781	378	257749
280	244715	313	249554	346	253907	379	257863
281	244870	314	249692	347	254032	380	257978
282	245024	315	249831	348	254157	381	258192
283	245178	316	249968	349	254282	382	258206
284	245331	317	250105	350	254406	383	258319
285	245484	318	250242	351	254530	384	258433
286	245636	319	250379	352	254654	385	258546
287	245788	320	250515	353	254777	386	258658
288	245939	321	250650	354	254900	387	258771
289	246089	322	250785	355	255022	388	258883
290	246239	323	250920	356	255145	389	258994
291	246389	324	251054	357	255266	390	259106
292	246538	325	251188	358	255388	361	259217
293	246686	326	251320	359	255509	392	259328
294	246834	327	251454	360	255630	393	259439
295	246982	328	251587	361	255750	394	259549
296	247129	329	251719	362	255870	395	259659
297	247275	330	251851	363	255990	396	259769

Chilias i.

Num.	Logar.	Num.	Logar.	Num.	Logar.	Num.	Logar.
397	259879	430	263346	463	266558	496	269548
398	259988	431	263447	464	266651	497	269635
399	260097	432	263548	465	266745	498	269722
400	260206	433	263648	466	266838	499	269810
401	260314	434	263748	467	266931	500	269897
402	260422	435	263848	468	267024	501	269983
403	260530	436	263948	469	267117	502	270070
404	260638	437	264048	470	267209	503	270156
405	260745	438	264147	471	267302	504	270243
406	260852	439	264246	472	267394	505	270329
407	260959	440	264345	473	267486	506	270415
408	261066	441	264443	474	267577	507	270500
409	261172	442	264542	475	267669	508	270586
410	261278	443	264640	476	267760	509	270671
411	261384	444	264738	477	267851	510	270757
412	261489	445	264836	478	267942	511	270842
413	261595	446	264933	479	268033	512	270926
414	261700	447	264030	480	268124	513	271011
415	261804	448	265127	481	268214	514	271096
416	261909	449	265224	482	268304	515	271180
417	262013	450	265321	483	268394	516	271264
418	262117	451	265417	484	268484	517	271349
419	262221	452	265513	485	268574	518	271433
420	262324	453	265609	486	268663	519	271516
421	262428	454	265705	487	268752	520	271600
422	262531	455	265801	488	268841	521	271683
423	262634	456	265896	489	268930	522	271767
424	262736	457	265991	490	269019	523	271850
425	262838	458	266086	491	269108	524	271933
426	262940	459	266181	492	269196	525	272015
427	263042	460	266275	493	269284	526	272097
428	263144	461	266370	494	269372	527	272180
429	263245	462	266464	495	269460	528	272262

Chilias i.

Num.	Logar.	Num.	Logar.	Num.	Logar.	Num.	Logar.
529	272355	562	274973	595	277451	628	279795
530	272427	563	275050	596	277524	629	279865
531	272509	564	275127	597	277597	630	279934
532	272591	565	275204	598	277670	631	280002
533	272672	566	275281	599	277742	632	280071
534	272754	567	275358	600	277819	633	280140
535	272835	568	275434	601	277887	634	280208
536	272916	569	275511	602	277959	635	280277
537	272997	570	275587	603	278031	636	280345
538	273058	571	275663	604	278103	637	280413
539	273158	572	275739	605	278175	638	280482
542	273236	573	275815	606	278247	639	280550
541	273319	574	275891	607	278318	640	280618
542	273399	575	275966	608	278390	641	280685
543	273479	576	276042	609	278461	642	280753
544	273559	577	276017	610	278538	643	280821
545	273639	578	276192	611	278604	644	280888
546	273719	579	276267	612	278675	645	280955
547	273798	580	276342	613	278746	646	281023
548	273878	581	276417	614	278816	647	281090
549	273957	582	276492	615	278887	648	281157
550	274036	583	276566	616	278958	649	281224
551	274115	584	276641	617	279028	650	281291
552	274193	585	276715	618	279098	651	281358
553	274272	586	276789	619	279169	652	281424
554	274350	587	276863	620	279239	653	281491
555	274429	588	276947	621	279309	654	281557
556	274507	589	277011	622	279379	655	281624
557	274585	590	277085	623	279448	656	281690
558	274663	591	277158	624	279518	657	281756
559	274741	592	277232	625	279588	658	281822
560	274818	593	277305	626	279657	659	281888
561	274896	594	277378	627	279726	660	281944

Chilias. i.

Num	Logar.	Num	Logar.	Num	Logar.	Num	Logar.
661	282022	694	284135	727	286153	760	288081
662	282085	695	284198	728	286213	761	288138
663	282151	696	284260	729	286272	762	288195
664	282216	697	284323	730	286332	763	288252
665	282282	698	284385	731	286391	764	288309
666	282347	699	284447	732	286451	765	288366
667	282412	700	284509	733	286510	766	288422
668	282477	701	284571	734	286569	767	288479
669	282542	702	284633	735	286628	768	288536
670	282607	703	284695	736	286687	769	288592
671	282672	704	284757	737	286746	770	288649
672	282736	705	284818	738	286805	771	288705
673	282801	706	284880	739	286864	772	288761
674	282865	707	284941	740	286923	773	288817
675	282910	708	285003	741	286981	774	288874
676	282994	709	285064	742	287040	775	288930
677	283058	710	285125	743	287098	776	288986
678	283122	711	285186	744	287157	777	289042
679	283186	712	285248	745	287215	778	289097
680	283250	713	285308	746	287273	779	289153
681	283314	714	285369	747	287331	780	289209
682	283378	715	285430	748	287390	781	289265
683	283442	716	285491	749	287448	782	289320
684	283505	717	285551	750	287506	783	289376
685	283569	718	285612	751	287563	784	289431
686	283632	719	285672	752	287621	785	289486
687	283695	720	285733	753	287679	786	289542
688	283758	721	285793	754	287737	787	289597
689	283821	722	285853	755	287794	788	289652
690	283884	723	285913	756	287852	789	289707
691	283947	724	285973	757	287909	790	289762
692	284010	725	286033	758	287966	791	289817
693	284073	726	286093	759	288024	792	289872

Chilias I.

Num.	Logar.	Num.	Logar.	Num.	Logar.	Num.	Logar.
793	289927	826	291698	859	293399	892	295036
794	289982	827	291750	860	293449	893	295085
795	290036	828	291803	861	293500	894	295133
796	290091	829	291855	862	293550	895	295182
797	290145	830	291907	863	293601	896	295230
798	290200	831	291960	864	293651	897	295279
799	290254	832	292012	865	293701	898	295327
800	290309	833	292063	866	293751	899	295375
801	290363	834	292116	867	293801	900	295424
802	290417	835	292168	868	293851	901	295472
803	290471	836	292220	869	293901	902	295520
804	290525	837	292272	870	293951	903	295568
805	290579	838	292324	871	294001	904	295616
806	290633	839	292376	872	294051	905	295664
807	290687	840	292427	873	294101	906	295712
808	290741	841	292479	874	294151	907	295760
809	290794	842	292531	875	294200	908	295808
810	290848	843	292582	876	294250	909	295856
811	290902	844	292634	877	294299	910	295904
812	290955	845	292685	878	294349	911	295951
813	291009	846	292737	879	294398	912	295999
814	291062	847	292788	880	294448	913	296047
815	291115	848	292839	881	294497	914	296094
816	291169	849	292890	882	294546	915	296142
817	291222	850	292931	883	294596	916	296189
818	291275	851	292992	884	294645	917	296236
819	291328	852	293043	885	294694	918	296284
820	291381	853	293094	886	294743	919	296331
821	291434	854	293145	887	294792	920	296378
822	291487	855	293196	888	294841	921	296425
823	291539	856	293247	889	294890	922	296473
824	291592	857	293298	890	294939	923	296520
825	291645	858	293348	881	294987	924	296567

Chilias. 1.

Num	Logar.	Num	Logar.	Num	Logar.	Num	Logar.
925	296614	944	297497	963	298362	982	299211
926	296661	945	297543	964	298407	983	299255
927	296707	946	297589	965	298452	984	299299
928	296754	947	297635	966	298497	985	299343
929	296801	948	297680	967	298542	986	299387
930	296848	949	297726	968	298587	987	299431
931	296894	950	297772	969	298632	988	299475
932	296941	951	297818	970	298677	989	299519
933	296988	952	297863	971	298721	990	299563
934	297034	952	297909	972	298766	991	299607
935	297081	954	297954	973	298811	992	299651
936	297127	955	298000	974	298855	993	299694
937	297173	956	298045	975	298900	994	299738
938	297220	957	298091	976	298944	995	299782
939	297266	958	298136	977	298989	996	299825
940	297312	959	298181	978	299033	997	299869
941	297358	960	298227	979	299078	998	299913
942	297405	961	298272	980	299122	990	299956
943	297451	962	298317	981	299166	1000	300000

Here follow.

Certain Necessary

TABLES

USEFUL

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NAVIGATION.

A Table of Meridional Parts

Latit.			Lat.		Lat.		Lat.	
D.	M.	Parts.	D.	Parts.	D.	Parts.	D.	Parts.
0	00	0000	5	0300	10	0603	15	0910
	10	0010		0310		0613		0921
	20	0020		0320		0623		0931
	30	0030		0330		0633		0941
	40	0040		0340		0644		0952
	50	0050		0350		0654		0962
1	00	0060	6	0360	11	0664	16	0972
	10	0070		0371		0674		0983
	20	0080		0381		0684		0993
	30	0090		0391		0694		1004
	40	0100		0401		0705		1014
	50	0110		0411		0715		1025
2	00	0120	7	0421	12	0725	17	1035
	10	0130		0431		0735		1046
	20	0140		0441		0746		1056
	30	0150		0451		0756		1067
	40	0160		0461		0766		1077
	50	0170		0471		0776		1087
3	00	0180	8	0481	13	0787	18	1098
	10	0190		0491		0797		1109
	20	0200		0502		0807		1119
	30	0210		0512		0817		1130
	40	0220		0522		0828		1140
	50	0230		0532		0838		1151
4	00	0240	9	0542	14	0848	19	1161
	10	0250		0552		0859		1172
	20	0260		0562		0869		1183
	30	0270		0572		0879		1193
	40	0280		0583		0890		1204
	50	0290		0593		0900		1214
5	00	0300	10	0603	15	0910	20	1225

A Table of Meridional Parts.

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Latit.			Lat.		Lat.		Lat.	
D.	M.	Parts.	D.	Parts.	D.	Parts.	D.	Parts.
20	00	1225	25	1550	30	1888	35	2244
	10	1236		1561		1900		2256
	20	1246		1572		1911		2269
	30	1257		1583		1923		2281
	40	1268		1594		1935		2293
	50	1278		1605		1946		2306
21	00	1289	26	1616	31	1958	36	2318
	10	1300		1628		1970		2330
	20	1311		1639		1981		2343
	30	1321		1650		1993		2355
	40	1332		1661		2005		2368
	50	1343		1672		2017		2380
22	00	1354	27	1683	32	2028	37	2392
	10	1364		1691		2040		2405
	20	1375		1706		2052		2418
	30	1386		1717		2064		2430
	40	1397		1728		2076		2443
	50	1408		1740		2088		2456
23	00	1419	28	1751	33	2000	38	2468
	10	1430		1762		2111		2481
	20	1440		1774		2123		2494
	30	1451		1785		2135		2506
	40	1462		1797		2147		2519
	50	1473		1808		2159		2532
24	00	1484	29	1819	34	2171	39	2545
	10	1495		1831		2183		2558
	20	1506		1842		2196		2571
	30	1517		1854		2208		2584
	40	1528		1865		2220		2597
	50	1539		1877		2232		2610
25	00	1550	30	1888	35	2244	40	2623

A Table of Meridional Parts:

Latit.			Lat.		Lat.		Lat.	
D.	M.	Parts.	D.	Parts.	D.	Parts.	D.	Parts.
40	00	2623	45	3030	50	3475	55	3968
	10	2636		3044		3490		3086
	20	2649		3056		3506		4003
	30	2662		3073		3521		4021
	40	2675		3087		3537		4038
	50	2688		3101		3553		4056
41	00	2701	46	3116	51	3560	56	4074
	10	2715		3144		3585		4092
	20	2728		3156		3601		4110
	30	2741		2173		3617		4128
	40	2755		3187		3633		4146
	50	2768		3101		3649		4164
42	00	2782	47	3216	52	3665	57	4183
	10	2795		3217		3682		4201
	20	2809		3232		3698		4220
	30	2822		3247		3714		4238
	40	2836		3262		3731		4207
	50	2849		3277		3747		4276
43	00	2863	48	3292	53	3764	58	4294
	10	2877		3307		3780		4313
	20	2890		3322		3797		4332
	30	2904		3337		3814		4352
	40	2918		3352		3831		4371
	50	2936		3367		3848		4390
44	00	2942	49	3382	54	3865	59	4409
	10	2960		3397		3887		4429
	20	2974		3413		3900		4448
	30	2988		3428		3917		4468
	40	3002		3443		3933		4488
	50	3016		3459		3951		4408
45	00	3030	50	3415	55	3968	60	4428

A Table of Meridional Parts

Latit.			Lat.		Lat.		Lat.	
D.	M.	Parts.	D.	Parts.	D.	Parts.	D.	Parts.
60	00	4528	65	5179	70	5967	75	6971
	10	4538		5203		5996		7010
	20	4568		5227		6026		7050
	30	4588		5251		6055		7090
	40	4608		5275		6085		7130
	50	4629		5299		6116		7170
61	00	4648	66	5324	71	6146	76	7211
	10	4670		5349		6177		7253
	20	4691		5373		6208		7295
	30	4712		5398		6240		7338
	40	4733		5424		6271		7381
	50	4754		5449		6303		7424
62	00	4775	67	5474	72	6336	77	7469
	10	4797		5500		6368		7513
	20	4818		5526		6401		7559
	30	4840		5552		6434		7605
	40	4861		5578		6468		7651
	50	4883		5605		6501		7698
63	00	4905	68	5631	73	6535	78	7746
	10	4927		5658		6570		7795
	20	4950		5685		6604		7844
	30	4972		5712		6639		7894
	40	4994		5740		6645		7944
	50	5017		5767		6711		7995
64	00	5040	69	5795	74	6747	79	8047
	10	5063		5823		6783		8100
	20	5086		5851		6820		8154
	30	5109		5880		6857		8208
	40	5132		5909		6895		8264
	50	5156		5937		6933		8320
65	00	5179	70	5967	75	6971	80	8377

D. Dep.		Lat.		D. Dep.		Lat.	
1	0 49	0 998		1	0 242	0 970	
2	0 698	1 997		2	0 485	1 940	
3	0 147	2 996		3	0 728	2 910	
4	0 196	3 995		4	0 971	3 880	
5	0 245	4 994		5	1 214	4 850	
6	0 294	5 992		6	1 457	5 820	
7	0 343	6 991		7	1 700	6 790	
8	0 392	7 990		8	1 943	7 760	
9	0 441	8 989		9	2 186	8 730	6 3
10	0 490	9 987	7 $\frac{3}{4}$	10	2 429	9 700	6 4
1	0 98	0 995		1	0 290	0 956	
2	0 196	1 990		2	0 580	1 913	
3	0 294	2 985		3	0 870	2 870	
4	0 392	3 980		4	1 161	3 827	
5	0 490	4 975		5	1 450	4 784	
6	0 588	5 971		6	1 741	5 781	
7	0 686	6 966		7	2 31	6 698	
8	0 784	7 961		8	2 322	7 655	
9	0 882	8 956		9	2 612	8 612	6 $\frac{1}{2}$
10	0 980	9 951	7 $\frac{1}{2}$	10	2 902	9 569	6 2
1	0 146	0 985		1	0 336	0 941	
2	0 293	1 978		2	0 673	1 883	
3	0 440	2 967		3	1 10	2 824	
4	0 586	3 956		4	1 647	3 766	
5	0 733	4 945		5	1 384	4 707	
6	0 880	5 931		6	2 21	5 649	
7	1 27	6 924		7	2 358	6 590	
8	1 173	7 913		8	2 695	7 632	
9	1 320	8 902		9	3 32	8 473	6 $\frac{1}{2}$
10	1 467	9 991	7 $\frac{1}{4}$	10	3 368	9 415	6 4
1 p	0 195	0 980		1	0 382	0 923	6 p
2	0 390	1 961		2	0 765	1 847	
3	0 585	2 942		3	1 148	2 771	
4	0 780	3 923		4	1 530	3 695	
5	0 975	4 903		5	1 913	4 619	
6	1 170	5 884		6	2 296	5 543	
7	1 365	6 865		7	2 678	6 467	
8	1 560	7 846		8	3 61	7 391	
9	1 755	8 827		9	3 444	8 314	
10	1 950	9 807	7 p	10	3 826	9 238	
Lat. Dep.				Lat.			

D. Dep. Lat.			D. Dep. Lat.			
2	1	0 427	0 903	1	0 595	0 803
	2	0 855	1 807	2	1 191	1 606
	3	1 282	2 711	3	1 787	2 409
	4	1 710	3 615	4	2 382	3 212
	5	2 137	4 519	5	2 978	4 16
	6	2 561	5 423	6	3 574	4 819
	7	2 992	6 327	7	4 169	5 622
	8	3 420	7 231	8	4 765	6 425
	9	3 847	8 135	9	5 361	7 228
	10	4 275	9 39	10	5 956	8 32
<u>5 3</u>			<u>3 1</u>	<u>34</u>		
2	1	0 471	0 881	1	0 634	0 673
	2	0 942	1 763	2	1 268	1 546
	3	1 414	2 645	3	1 903	2 319
	4	1 885	3 527	4	2 537	3 92
	5	2 356	4 409	5	3 171	3 865
	6	2 828	5 291	6	3 806	4 638
	7	3 299	6 173	7	4 441	5 411
	8	3 771	7 55	8	5 75	6 184
	9	4 242	8 937	9	5 709	6 951
	10	4 713	9 819	10	6 343	7 701
<u>5 1</u>			<u>3 1</u>	<u>4 1</u>		
2	1	0 514	0 859	1	0 771	0 740
	2	1 28	1 715	2	1 343	1 481
	3	1 542	2 573	3	2 14	2 222
	4	2 56	3 430	4	2 686	2 963
	5	2 570	4 288	5	3 357	3 704
	6	3 84	5 146	6	4 29	4 445
	7	3 598	6 04	7	4 700	5 185
	8	4 112	7 861	8	5 372	5 926
	9	4 626	8 719	9	6 44	6 667
	10	5 141	9 577	10	6 715	7 408
<u>5 4</u>			<u>3 3</u>	<u>4 1</u>		
3 p	1	0 555	6 831	1	0 707	0 707
	2	1 111	1 662	2	1 414	1 414
	3	1 666	2 494	3	2 121	2 121
	4	2 222	3 325	4	2 828	2 828
	5	2 777	4 157	5	3 535	3 535
	6	3 333	5 988	6	4 242	4 242
	7	3 888	6 820	7	4 949	4 949
	8	4 444	7 651	8	5 656	5 656
	9	5 000	8 483	9	6 463	6 363
	10	5 555	9 314	10	7 71	7 71
<u>5 p</u>			<u>4 p</u>	<u>4 p</u>		
D.	Lat.	Dep.	D.	Lat.	Dep.	

The second Table of Rumbs.

gr	Latit.	First		Second		Third		Fourth	
	m,	Long.	diff.	Long.	diff.	Long.	diff.	Long.	diff.
0	10	0 2	2	0 4	4	0 7	6	0 10	10
	20	0 4	2	0 8	4	0 13	7	0 20	10
	30	0 6	2	0 12	4	0 20	7	0 30	10
	40	0 8	2	0 16	4	0 27	6	0 40	10
	50	0 10	2	0 20	5	0 33	7	0 50	10
1	00	0 12	2	0 25	4	0 40	7	1 00	10
	10	0 14	2	0 29	4	0 47	6	1 10	10
	20	0 16	2	0 33	4	0 53	7	1 20	10
	30	0 18	2	0 37	4	1 0	7	1 30	10
	40	0 20	2	0 41	4	1 7	6	1 40	10
2	50	0 22	2	0 45	5	1 13	7	1 50	10
	00	0 24	2	0 50	4	1 20	7	2 00	10
	10	0 26	2	0 54	4	1 27	6	2 10	10
	20	0 28	2	0 58	4	1 33	7	2 20	10
	30	0 30	2	1 2	4	1 40	7	2 30	10
3	40	0 32	2	1 6	4	1 47	6	2 40	10
	50	0 34	2	1 10	5	1 53	7	2 50	10
	00	0 36	2	1 15	4	2 0	7	3 00	10
	10	0 38	2	1 19	4	2 7	6	3 10	10
	20	0 40	2	1 23	4	2 13	7	3 20	10
4	30	0 42	2	1 27	4	2 20	7	3 30	10
	40	0 44	2	1 31	4	2 27	6	3 40	10
	50	0 46	2	1 35	4	2 33	7	3 50	10
	00	0 48	2	1 39	4	2 40	7	4 00	10
	10	0 50	2	1 43	5	2 47	6	4 10	10
5	20	0 52	2	1 48	4	2 54	7	4 20	10
	30	0 54	2	1 52	4	3 0	7	4 30	10
	40	0 56	2	1 56	4	3 7	6	4 40	10
	50	0 58	2	1 0	4	3 14	7	4 50	10
	00	1 00	2	1 4	4	3 21	7	5 00	10

To find the Difference of Longitude.

Latit.		Fifth.		Sixth		Seventh	
D.	M.	Long.	diff.	Long.	diff.	Long.	diff.
0	10	0 15	15	0 24	24	0 50	50
	20	0 30	15	0 48	24	1 40	51
	30	0 45	15	1 12	24	2 31	50
	40	1 0	15	1 36	24	3 21	50
	50	1 14	15	2 0	25	4 11	50
	00	1 29	15	2 25	24	5 1	51
1	10	1 44	15	2 40	24	5 52	50
	20	1 59	15	3 13	24	6 42	50
	30	2 14	15	3 37	24	7 32	50
	40	2 29	15	3 1	24	8 22	51
	50	2 44	15	4 25	25	9 13	50
	00	2 59	15	4 50	24	10 3	51
2	10	3 14	15	5 14	24	10 54	50
	20	3 29	15	5 38	24	11 44	50
	30	3 44	15	6 2	24	12 34	50
	40	3 59	15	6 26	24	13 24	51
	50	4 14	15	6 50	25	14 15	50
	00	4 29	15	7 15	24	15 5	51
3	10	4 44	15	7 39	24	15 56	50
	20	4 59	15	8 3	24	16 46	50
	30	5 14	15	8 27	24	17 36	50
	40	5 29	15	8 51	24	18 26	51
	50	5 44	15	9 15	25	19 17	50
	00	6 0	15	9 40	24	20 7	51
4	10	6 15	15	10 4	24	20 58	50
	20	6 30	15	10 28	24	21 48	51
	30	6 45	15	10 53	24	22 35	50
	40	7 0	15	11 17	24	23 25	51
	50	7 15	15	11 41	25	24 20	50
	00	7 30	15	12 50	24	25 10	51
5	10	7 45	15				
	20	8 0	15				
	30	8 15	15				
	40	8 30	15				
	50	8 45	15				
	00	9 0	15				

The second Table of Rumbs.

Latit.		First.		Second		Third.		Fourth			
gr.	m.	Long.	diff.	Long.	diff.	Long.	diff.	Long.	diff.	Long.	diff.
5	10	1	2	22	8	4	3	27	75	10	10
	20	1	4	22	12	4	3	34	75	20	10
	30	1	6	22	16	4	3	41	75	30	10
	40	1	8	22	20	5	3	48	63	40	10
	50	1	10	22	25	4	3	54	75	50	10
6	00	1	12	22	29	4	4	1	66	01	10
	10	1	14	22	33	5	4	7	76	11	10
	20	1	16	22	38	4	4	14	76	21	10
	30	1	18	22	42	4	4	21	76	31	10
	40	1	20	22	46	4	4	28	66	41	10
7	50	1	22	22	50	5	4	34	76	50	10
	00	1	24	22	55	4	4	41	77	01	10
	10	1	26	22	59	4	4	48	77	11	10
	20	1	28	23	3	4	4	55	77	21	10
	30	1	30	23	7	4	5	2	77	31	10
8	40	1	32	23	11	4	5	9	67	41	10
	50	1	34	23	14	4	5	15	77	51	10
	00	1	36	23	19	5	5	22	78	02	10
	10	1	38	23	24	4	5	29	78	12	10
	20	1	40	23	28	4	5	36	68	22	10
9	30	1	42	23	32	4	5	42	78	32	10
	40	1	44	23	36	4	5	49	68	42	10
	50	1	46	23	40	4	5	55	78	52	10
	00	1	48	23	44	5	6	2	79	02	10
	10	1	50	23	49	4	6	9	79	12	10
10	20	1	52	23	53	4	6	16	79	22	10
	30	1	54	23	57	4	6	23	79	33	10
	40	1	56	24	1	5	6	30	69	43	10
	50	1	58	24	6	4	6	36	79	53	10
	00	2	60	24	10	4	6	43	710	03	10

To find the Difference of Longitude.

Latit.		Fifth			Sixth			Seventh		
D.	M.	Long.		diff.	Long.		diff.	Long.		diff.
5	10	7	45	15	12	29	24	26	1	50
	20	8	0	15	12	53	25	26	51	50
	30	8	15	15	13	18	24	27	41	51
	40	8	30	15	13	42	24	28	32	51
	50	8	44	15	14	6	25	29	23	50
6	00	9	0	15	14	31	24	30	13	51
	10	9	15	15	14	55	24	31	4	50
	20	9	30	15	15	19	25	31	54	51
	30	9	45	15	15	44	24	32	45	50
	40	10	0	15	16	8	24	33	25	50
7	50	10	15	15	16	32	24	34	15	51
	00	10	30	15	16	56	24	35	16	51
	10	10	45	15	17	20	24	36	7	51
	20	11	0	15	17	44	25	36	58	51
	30	11	15	15	18	9	24	37	49	50
8	40	11	30	15	18	33	24	38	39	50
	50	11	45	16	18	57	25	39	29	51
	00	12	1	15	19	22	24	40	20	51
	10	12	16	15	19	46	25	41	11	51
	20	12	31	15	20	11	25	42	2	51
9	30	12	46	15	20	36	24	42	53	50
	40	13	1	15	21	0	24	43	43	51
	50	13	16	15	21	24	25	44	34	51
	00	13	41	15	21	49	24	45	25	51
	10	13	46	15	22	13	24	46	16	51
10	20	14	1	16	22	37	25	47	7	51
	30	14	16	15	23	2	24	47	58	51
	40	14	32	15	23	26	25	48	49	51
	50	14	47	15	23	51	25	49	50	51
	00	15	2	15	24	16	24	50	31	51

The second Table of Rumbs.

Latit.		First.		Second		Third.		Fourth	
gr.	m.	Long.	diff.	Long.	diff.	Long.	diff.	Long.	diff.
5	10	2	2	24	14	4	6	50	6
	20	2	4	24	18	4	6	57	7
	30	2	6	24	22	4	7	3	7
	40	2	8	24	26	5	7	10	7
	50	2	10	24	31	4	7	17	6
6	00	2	12	24	35	4	7	23	7
	10	2	14	24	39	4	7	30	7
	20	2	16	24	43	4	7	37	7
	30	2	18	24	48	4	7	44	7
	40	2	20	24	52	4	7	50	7
7	50	2	22	24	56	5	7	58	6
	00	2	24	25	1	4	8	4	7
	10	2	26	25	5	4	8	11	7
	20	2	28	25	9	4	8	18	7
	30	2	30	25	13	5	8	25	7
8	40	2	32	25	18	4	8	32	7
	50	2	34	25	22	4	8	39	7
	00	2	37	25	26	4	8	46	6
	10	2	39	25	30	4	8	52	7
	20	2	41	25	34	4	8	59	7
9	30	2	43	25	38	9	9	6	7
	40	2	45	25	43	4	9	13	7
	50	2	47	25	47	4	9	20	7
	00	2	49	25	51	4	9	27	7
	10	2	51	25	55	5	9	34	7
10	20	2	53	26	0	4	9	41	7
	30	2	55	26	4	4	9	48	6
	40	2	58	26	8	5	9	54	7
	50	2	55	26	13	4	10	1	7
	00	2	1	26	17	4	10	8	7

To find the Difference of Longitude.

Latit.		Fifth			Sixth			Seventh		
D	M.	Long.		diff.	Long.		diff.	Long.		diff.
15	10	15	17	15	24	40	24	51	22	52
	20	15	32	16	25	4	25	52	14	51
	30	15	48	15	25	29	24	53	5	51
	40	16	3	15	25	53	24	53	56	51
	50	16	18	16	26	18	25	54	47	51
16	00	16	43	15	26	43	24	55	38	51
	10	16	49	16	27	7	25	56	29	51
	20	17	5	15	27	32	24	57	30	52
	30	17	20	15	27	57	24	58	12	51
	40	17	35	15	28	21	24	59	3	52
	50	17	50	15	28	45	25	59	54	52
17	00	18	5	15	29	10	25	60	46	51
	10	18	20	15	29	35	25	61	37	51
	20	18	25	16	30	0	25	62	28	52
	30	18	51	15	30	25	24	63	20	51
	40	19	6	15	30	49	25	64	11	52
	50	19	21	16	31	14	25	65	3	52
18	00	19	37	15	31	39	25	65	55	52
	10	19	52	16	32	4	25	66	47	51
	20	20	8	15	32	29	25	67	38	52
	30	20	23	15	32	54	24	68	30	51
	40	20	38	16	33	18	25	69	21	52
	50	20	54	16	33	43	25	70	13	52
19	00	21	10	15	34	8	25	71	5	52
	10	21	25	15	34	33	25	71	57	52
	20	21	40	16	34	48	25	72	49	52
	30	21	56	15	35	23	25	73	41	52
	40	22	11	15	35	48	25	74	33	52
	50	22	26	16	36	13	25	75	25	52
20	00	22	42	15	36	38	25	76	17	52

The Second Table of Rumps.

Latit.		First,		Second,		Third		Fourth	
gr	m,	Long	diff.	Long	diff.	Long.	diff.	Long.	diff.
15	10	3	3	26	21	5	10	15	2
	20	3	5	26	25	4	10	22	7
	30	3	7	26	30	4	10	29	7
	40	3	9	26	34	5	10	36	7
	50	3	11	26	39	4	10	43	7
16	00	3	13	26	49	4	10	50	7
	10	3	15	26	47	4	10	57	7
	20	3	17	26	51	5	11	4	7
	30	3	19	26	56	4	11	11	7
	40	3	22	27	0	4	11	18	7
17	50	3	24	27	4	4	11	25	7
	00	3	26	27	8	5	11	32	7
	10	3	28	27	13	4	11	39	7
	20	3	30	27	17	4	11	46	7
	30	3	32	27	21	5	11	51	7
18	40	3	34	27	26	4	12	0	7
	50	3	36	27	30	5	12	7	7
	00	3	38	27	35	4	12	14	7
	10	3	40	27	39	4	12	22	7
	20	3	42	27	43	4	12	28	7
19	30	3	44	27	47	5	12	35	7
	40	3	46	27	52	5	12	42	7
	50	3	49	27	57	4	12	49	7
	00	3	51	28	1	4	12	56	7
	10	3	53	28	5	5	13	3	7
20	20	3	55	28	10	4	13	10	7
	30	3	57	28	14	4	13	17	7
	40	3	59	28	18	5	13	24	7
	50	4	1	28	23	4	13	31	7
	00	4	4	28	27	5	13	38	7

To find the Difference of Longitude.

Latit.		Fifth.			Sixth			Seventh		
D.	M.	Long.		diff.	Long.		diff.	Long.		diff.
15	10	22	57	16	37	2	25	77	9	52
	20	23	13	15	37	28	25	78	1	52
	30	23	28	16	37	53	25	78	53	52
	40	23	44	16	38	18	25	79	43	52
	50	24	0	16	38	43	25	80	37	52
16	00	24	16	15	39	8	25	81	30	52
	10	24	31	16	39	33	25	82	22	52
	20	24	47	16	39	58	26	83	14	53
	30	25	3	15	40	24	25	84	7	52
	40	25	18	15	40	48	25	84	59	53
17	50	25	33	16	41	14	25	85	52	53
	00	25	49	15	41	39	25	86	45	52
	10	26	4	16	42	4	25	87	37	52
	20	26	20	16	42	29	26	88	29	53
	30	26	36	15	42	55	25	89	22	53
18	40	26	51	16	43	20	25	90	15	53
	50	27	7	16	43	45	26	91	8	53
	00	27	23	16	44	11	25	92	1	53
	10	27	39	16	44	36	25	92	53	52
	20	27	55	16	45	1	26	93	47	53
19	30	28	11	15	45	27	25	94	40	53
	40	28	25	16	45	52	25	95	33	53
	50	28	42	16	46	14	26	96	29	53
	00	28	58	16	46	44	25	97	19	53
	10	29	14	16	47	9	26	98	12	53
20	20	29	30	16	47	35	26	99	5	53
	30	29	46	15	48	1	25	99	59	53
	40	30	1	16	48	26	25	100	52	53
	50	30	17	16	48	51	26	101	45	53
	00	30	33	16	49	17	26	102	38	53

The second Table of Rumbs.

Latit.		First.		Second.		Third		Fourth	
D.	M.	Long.	diff.	Long.	diff.	Long.	diff.	Long.	diff.
20	10	4 6	3	8 32	4	13 45	7	20 35	11
	20	4 9	2	8 36	5	13 52	8	20 46	11
	30	4 13	2	8 41	5	14 0	7	20 57	10
	40	4 15	2	8 46	4	14 7	7	21 7	11
	50	4 16	2	8 50	4	14 14	7	21 18	11
21	00	4 17	2	8 54	4	14 21	7	21 29	10
	10	4 19	2	8 58	5	14 28	8	21 39	11
	20	4 21	2	9 3	5	14 36	7	21 50	11
	30	4 23	2	9 7	4	14 43	7	22 1	11
	40	4 25	2	9 12	4	14 50	7	22 12	11
22	50	4 27	2	9 16	4	14 57	7	22 23	11
	00	4 29	2	9 20	5	15 4	7	22 34	10
	10	4 31	2	9 25	5	15 11	7	22 44	11
	20	4 33	2	9 30	4	15 18	8	22 55	11
	30	4 35	3	9 34	4	15 26	7	23 6	10
23	40	4 37	2	9 38	5	15 33	8	23 16	11
	50	4 40	2	9 43	4	15 41	7	23 27	11
	00	4 42	2	9 47	5	15 42	7	23 38	10
	10	4 44	2	9 52	5	15 55	8	23 49	11
	20	4 46	2	9 57	5	16 3	7	24 0	11
24	30	4 48	3	10 2	4	16 10	7	24 11	11
	40	4 51	2	10 6	4	16 17	8	24 22	11
	50	4 53	2	10 10	4	16 25	7	24 33	11
	00	4 55	2	10 14	5	16 32	7	24 44	11
	10	4 57	2	10 19	5	16 39	7	24 55	11
25	20	4 59	3	10 24	5	16 46	8	25 6	11
	30	5 4	2	10 29	4	16 53	7	25 17	11
	40	5 5	2	10 33	4	16 1	7	25 28	11
	50	5 6	2	10 37	5	16 6	8	25 39	11
	00	5 8	2	10 42	5	16 16	7	25 1	11

To find the Difference of Longitude.

Latit.		Fifth			Sixth			Seventh		
D.	M.	Long.		diff.	Long.		diff.	Long.		diff.
20	10	30	49	16	49	43	26	103	32	54
	20	31	5	16	50	9	26	104	26	54
	30	31	21	16	50	35	26	105	20	53
	40	31	37	16	51	0	26	106	13	54
	50	31	53	16	51	28	26	107	7	54
21	00	32	9	16	51	52	26	108	1	54
	10	32	25	16	52	18	26	109	55	54
	20	32	41	16	52	44	26	110	49	55
	30	32	57	16	53	10	26	111	43	54
	40	33	13	16	53	36	26	112	37	55
22	50	33	29	17	54	2	26	113	31	55
	00	33	46	16	54	28	26	114	25	54
	10	34	2	16	54	54	26	114	19	54
	20	34	18	16	55	20	26	115	13	55
	30	34	34	16	55	46	26	116	0	54
23	40	34	50	16	56	13	26	117	62	55
	50	35	6	17	56	38	27	117	57	55
	00	35	23	16	57	5	26	118	52	54
	10	35	39	16	57	31	26	119	46	55
	20	35	55	17	57	57	26	120	41	55
24	30	36	12	16	58	24	26	121	36	55
	40	36	28	16	58	50	26	122	31	55
	50	36	44	17	59	16	27	123	26	55
	00	37	1	16	59	43	26	124	21	55
	10	37	17	16	60	9	26	125	16	55
25	20	37	33	17	60	35	27	126	11	55
	30	37	50	16	61	2	26	127	6	55
	40	38	6	17	61	28	27	128	1	55
	50	38	23	17	61	55	27	128	56	56
	00	38	40	16	61	22	26	129	52	55

The second Table of Rumbs.

The Second Table of Rumors.													
Latit.		First		Second		Third.		Fourth					
D.	M.	Long.	diff.	Long.	diff.	Long.	diff.	Long.	diff.	Long.	diff.	Long.	diff.
25	10	5	10	2	10	47	4	17	23	7	26	1	11
	20	5	12	2	10	51	5	17	30	8	26	12	11
	30	5	14	3	10	56	5	17	38	7	26	23	11
	40	5	17	2	11	1	4	17	45	7	26	34	11
	50	5	19	2	11	5	5	17	52	8	26	45	11
26	00	5	21	2	11	10	4	18	0	7	26	56	11
	10	5	23	2	11	14	4	18	7	8	27	7	11
	20	5	25	2	11	18	5	18	15	8	27	18	11
	30	5	27	2	11	23	5	18	23	7	27	29	11
	40	5	30	2	11	28	5	18	30	7	27	40	11
27	50	5	32	2	11	33	4	18	37	8	27	51	12
	00	5	34	2	11	37	5	18	45	7	28	3	11
	10	5	36	3	11	42	5	18	52	7	28	14	11
	20	5	39	2	11	47	4	18	59	8	28	25	12
	30	5	41	2	11	51	5	19	7	8	28	37	11
28	40	5	43	3	11	56	5	19	10	7	28	48	11
	50	5	46	2	11	1	4	19	22	8	28	59	11
	00	5	48	2	12	5	5	19	30	7	29	11	12
	10	5	50	2	12	10	5	19	37	8	29	22	11
	20	5	52	3	12	15	5	19	45	8	29	33	12
29	30	5	54	2	12	20	4	19	53	7	29	45	11
	40	5	57	3	12	24	5	20	0	8	29	56	11
	50	6	0	2	12	29	4	20	8	8	30	7	12
	00	6	2	2	12	33	5	20	16	7	30	19	12
	10	6	4	3	12	38	5	20	23	8	30	30	11
30	20	6	7	2	12	43	5	20	21	8	30	42	11
	30	6	9	2	12	48	5	20	29	7	30	54	11
	40	6	11	2	12	53	4	20	46	8	31	5	11
	50	6	13	3	12	57	5	20	54	8	31	16	12
	00	6	16	2	13	2	5	21	2	7	31	18	11

To find the Difference of Longitude.

Latit.		Fifth			Sixth			Seventh		
D.	M.	Long.	diff.		Long.	diff.		Long.	diff.	
25	10	38	56	16	62	48	27	130	47	56
	20	39	12	17	63	15	27	131	43	56
	30	39	29	16	63	42	26	132	39	55
	40	39	45	17	64	8	27	133	34	56
	50	40	2	17	64	35	27	134	30	56
26	00	40	10	16	65	2	27	135	26	56
	10	40	35	17	65	29	27	136	22	56
	20	40	52	17	65	56	27	137	18	56
	30	41	9	17	65	23	27	138	14	56
	40	41	26	17	66	50	27	139	10	56
27	50	41	43	17	67	17	27	140	6	57
	00	42	0	16	67	44	27	141	3	56
	10	42	16	17	68	11	27	141	59	57
	20	42	33	17	68	38	28	142	56	57
	30	43	50	16	69	3	27	143	53	56
28	40	43	6	17	69	30	27	144	49	57
	50	43	23	17	70	0	28	145	46	57
	00	43	40	17	70	28	27	146	43	57
	10	43	57	17	70	55	27	147	40	57
	20	44	14	17	71	22	28	148	37	57
29	30	44	32	18	71	50	27	149	34	57
	40	44	49	17	72	17	27	150	31	57
	50	45	6	17	72	44	28	151	28	58
	00	45	23	17	72	12	27	152	26	58
	10	45	40	17	73	36	28	153	24	58
30	20	45	57	17	74	7	28	154	22	58
	30	46	14	17	74	35	28	155	20	58
	40	46	31	17	75	3	28	156	18	58
	50	46	48	18	75	31	28	157	16	58
	00	47	6	17	75	59	28	158	14	58

The second Table of Rumbs.

Latit.		First.		Second.		Third		Fourth	
D.	M.	Long	diff.	Long.	diff.	Long.	diff.	Long.	diff.
30	10	6 18	2 13	7	5 25	9	8 31	39	12
	20	6 20	2 13	12	4 25	17	8 31	51	12
	30	6 22	3 13	16	5 25	25	7 32	3	11
	40	6 25	2 13	21	5 25	32	8 32	14	12
	50	6 27	2 13	21	5 25	40	8 32	25	12
31	00	6 30	3 13	31	5 25	48	8 32	38	11
	10	6 32	2 13	36	5 25	56	8 32	49	12
	20	6 34	3 13	41	5 26	4	8 33	1	12
	30	6 37	2 13	46	5 26	12	7 33	13	11
	40	6 39	2 13	51	5 26	19	8 33	24	12
32	50	6 41	2 13	56	4 26	27	8 33	36	12
	00	6 43	3 14	0	5 26	35	8 33	48	12
	10	6 46	2 14	5	5 26	45	8 34	0	12
	20	6 48	3 14	10	5 26	51	8 34	12	12
	30	6 51	2 14	15	5 27	50	8 34	24	11
33	40	6 53	2 14	20	4 27	7	8 34	35	12
	50	6 55	3 14	24	5 27	15	8 34	47	12
	00	6 58	2 14	29	5 27	23	8 34	19	12
	10	7 0	3 14	34	5 27	31	8 35	11	12
	20	7 3	2 14	39	6 27	39	8 35	23	12
34	30	7 5	3 14	45	5 27	47	8 35	35	12
	40	7 8	2 14	50	5 27	55	8 35	47	12
	50	7 10	2 14	55	5 28	3	8 35	59	12
	00	7 12	2 15	0	5 28	11	8 36	11	12
	10	7 14	2 15	5	4 28	19	8 36	23	12
35	20	7 17	3 15	9	5 28	22	8 36	35	13
	30	7 20	2 15	14	5 28	35	8 36	48	12
	40	7 22	2 15	19	5 28	43	8 36	0	12
	50	7 24	2 15	24	6 28	51	8 36	12	12
	00	7 27	3 15	30	5 28	0	8 36	24	12

To find the of Difference Longitude.

Latit.		Fifth.		Sixth.		Seventh.	
D.	M.	Long.	diff.	Long.	diff.	Long.	diff.
30	10	47 23	17	76 27	28	159 12	58
	20	47 40	18	76 55	28	160 10	58
	30	47 58	17	77 33	28	161 8	58
	40	48 15	17	77 51	28	162 6	59
	50	48 32	17	78 19	28	163 5	59
31	00	48 50	17	78 47	28	164 4	59
	10	49 7	18	79 15	28	165 2	59
	20	49 25	18	79 43	29	166 1	59
	30	49 43	17	80 12	28	167 0	59
	40	50 0	18	80 40	28	167 59	59
32	50	50 18	18	81 8	29	168 58	59
	00	50 36	17	81 37	28	169 58	59
	10	50 53	17	82 5	28	170 57	59
	20	51 10	18	82 33	29	171 56	59
	30	51 28	18	83 2	29	172 55	60
33	40	51 46	18	83 31	29	173 55	60
	50	52 4	18	84 0	29	174 55	60
	00	52 22	18	84 29	28	175 45	60
	10	52 40	18	84 57	29	176 55	60
	20	52 58	18	85 26	29	177 55	60
34	30	53 16	18	85 55	29	178 55	60
	40	53 34	18	86 29	29	179 55	61
	50	53 52	18	86 53	29	180 56	61
	00	54 10	18	87 22	29	181 57	61
	10	54 28	18	87 51	29	182 57	61
35	20	54 46	18	88 20	30	183 58	61
	30	55 4	18	88 50	29	184 59	61
	40	55 22	18	89 29	29	186 0	61
	50	55 40	19	89 48	30	187 1	61
	00	55 59	18	90 18	28	188 2	61

The second Table of Rumbs.

Latit.		Firft.		Second		Third		Fourth	
D.	m.	Long.	diff	Long.	diff	Long.	diff	Long.	diff
35	10	7 29	2 25	35	5 25	6	8 37	39	12
	20	7 31	3 15	40	5 25	16	8 37	48	13
	30	7 34	2 15	45	5 25	24	8 38	1	12
	40	7 36	3 15	50	5 25	32	8 38	13	12
	50	7 39	2 15	55	5 25	40	9 38	25	13
	00	7 41	2 16	0	5 25	49	8 38	28	12
36	10	7 43	3 16	5	6 25	67	8 38	50	12
	20	7 46	2 16	11	5 26	5	9 39	2	13
	30	7 48	3 16	16	5 26	14	8 39	15	12
	40	7 51	2 16	21	5 26	22	8 39	27	12
	50	7 53	2 16	26	5 26	30	8 39	39	13
	00	7 55	3 16	31	5 26	28	8 39	52	12
37	10	7 58	3 16	36	5 26	46	9 40	4	13
	20	8 1	2 16	41	6 26	56	9 40	17	13
	30	8 3	3 16	47	5 27	4	8 40	30	12
	40	8 6	2 16	52	5 27	12	8 40	42	13
	50	8 8	3 16	57	5 27	20	9 40	55	13
	00	8 11	3 17	2	5 27	29	8 41	8	12
38	10	8 14	2 17	7	5 27	37	9 41	30	13
	20	8 16	3 17	12	6 27	46	9 41	33	13
	30	8 19	2 17	18	6 27	55	8 41	46	13
	40	8 21	3 17	24	5 28	3	8 41	59	13
	50	8 24	2 17	29	5 28	11	9 42	12	13
	00	8 26	3 17	34	5 28	20	8 42	25	12
39	10	8 29	2 17	39	5 28	28	9 42	38	13
	20	8 31	3 17	44	5 28	37	9 42	51	13
	30	8 34	3 17	49	6 29	46	9 43	4	13
	40	8 37	2 17	55	6 29	55	9 43	17	13
	50	8 39	3 18	1	5 29	4	9 43	30	13
	00	8 42	2 18	16	6 29	13	8 43	43	13
40	10	8 45	3 18	21	6 29	22	9 43	56	13
	20	8 48	2 18	26	6 29	31	9 43	69	13
	30	8 51	3 18	31	6 29	40	9 43	82	13
	40	8 54	2 18	36	6 29	49	9 43	95	13
	50	8 57	3 18	41	6 29	58	9 43	108	13
	00	8 59	2 18	46	6 29	67	9 43	121	13

To find the Difference of Longitude.

Latit.		Fifth.		diff.	Sixth.		dif	Seventh		dif
D.	M.	Long.			Long.			Long.		
35	10	56	17	18	90	47	30	189	3	62
	20	56	35	19	91	17	30	190	5	62
	30	56	54	18	91	47	29	191	7	62
	40	57	12	18	92	16	30	192	9	62
	50	57	30	19	92	46	30	193	11	62
36	00	57	49	18	93	16	30	194	13	62
	10	58	7	19	93	46	30	195	15	62
	20	58	26	19	94	16	30	196	17	63
	30	58	45	18	94	46	30	197	20	63
	40	59	3	19	95	16	30	198	22	63
37	50	59	22	19	95	46	30	199	25	63
	00	59	41	18	96	16	30	200	28	63
	10	59	59	19	96	46	30	201	31	63
	20	60	19	19	97	16	30	202	34	63
	30	60	37	19	97	47	31	203	37	64
38	40	60	56	19	98	17	30	204	41	64
	50	61	15	19	98	48	31	205	45	64
	00	61	34	19	99	19	30	206	49	63
	10	61	53	19	99	49	31	207	52	64
	20	62	12	19	100	20	31	208	56	64
39	30	62	31	19	100	51	31	210	0	64
	40	62	50	19	101	22	31	211	4	65
	50	63	9	20	101	53	31	212	9	65
	00	63	29	19	102	24	31	213	14	64
	10	63	48	19	102	55	31	214	18	65
40	20	64	7	20	103	26	31	215	23	65
	30	64	27	19	103	57	31	216	28	65
	40	64	46	19	104	28	31	217	33	66
	50	65	5	20	104	59	32	219	39	66
	00	65	25	19	105	31	31	218	55	65

The second Table of Ru mbs.

Latit.		First		Second		Third		Fourth		
D.	M.	Long.		diff	Long.	diff	Long.	diff	Long.	diff
40	10	8	44	1	18 12		6 29 21	9	43 56	13
	20	8	47	2	18 18		5 29 30	9	44 9	13
	30	8	49	3	18 24		5 29 39	9	44 22	13
	40	8	52	2	18 28		6 29 47	9	44 35	13
	50	8	54	3	18 34		5 30 56	9	44 48	14
41	00	8	57	3	18 39		5 30 5	9	45 2	13
	10	9	0	3	18 44		6 30 14	9	45 15	13
	20	9	3	3	18 50		6 30 23	9	45 28	13
	30	9	6	2	18 56		5 30 32	9	45 51	13
	40	9	8	3	19 1		5 30 41	9	45 54	14
	50	9	11	2	19 6		6 30 50	9	46 8	14
42	00	9	13	3	19 12		6 30 59	9	46 22	13
	10	9	16	2	19 18		5 31 8	9	46 35	13
	20	9	18	3	19 13		6 31 17	9	46 48	14
	30	9	21	3	19 29		6 31 26	9	47 2	13
	40	9	24	3	19 35		5 31 35	9	47 15	14
	50	9	27	2	19 40		6 31 44	9	47 29	14
43	00	9	30	3	19 46		6 31 53	9	47 43	13
	10	9	32	3	19 52		5 32 2	9	47 56	14
	20	9	35	2	19 57		6 32 11	9	48 10	14
	30	9	37	3	20 3		6 32 20	9	48 24	14
	40	9	40	3	20 9		6 32 29	9	48 38	14
	50	9	43	3	20 15		5 32 38	10	48 52	14
44	00	9	46	2	20 20		6 32 48	9	49 6	14
	10	9	48	3	20 26		6 32 57	9	49 20	14
	20	9	51	3	20 32		6 33 6	10	49 34	14
	30	9	54	3	20 38		6 33 16	9	49 48	14
	40	9	57	3	20 44		6 33 25	9	50 2	14
	50	10	0	3	20 50		5 33 34	10	50 16	14
45	00	10	3	3	20 55		6 33 44	9	50 30	14

To find the Difference of Longitude.

Latit.		Fifth			Sixth			Seventh	
D.	M.	Long.	diff.		Long.	diff.		Long.	diff.
40	10	65	44	20	106	0	32	220	50
	20	66	8	20	106	34	32	221	56
	30	66	24	19	107	6	32	223	2
	40	66	44	20	107	38	32	224	8
	50	67	3	20	108	10	32	225	15
41	00	67	23	20	108	40	32	226	52
	10	67	43	20	109	14	32	227	28
	20	68	3	20	109	46	32	228	35
	30	68	23	20	110	18	32	229	42
	40	68	43	20	110	50	32	230	49
42	50	69	3	20	111	22	33	231	56
	00	69	23	20	111	55	32	233	4
	10	69	43	20	112	27	33	234	12
	20	70	3	20	113	0	32	235	20
	30	70	23	20	113	32	33	236	28
43	40	70	43	21	114	5	33	237	36
	50	71	4	21	114	38	33	238	44
	00	71	25	20	115	11	33	239	53
	10	71	45	20	115	44	33	241	2
	20	72	5	21	116	17	34	242	11
44	30	72	26	20	116	51	33	243	20
	40	72	46	21	117	24	33	244	29
	50	73	7	21	117	57	34	245	39
	00	73	28		118	31	34	246	49
	10	73	48		119	5	34	247	59
45	20	74	10	21	119	39	34	248	9
	30	74	31	20	120	13	34	249	19
	40	74	51	21	120	47	34	250	30
	50	75	12	22	121	21	34	252	41
	00	75	34	21	121	55	34	253	52

The second Table of Rumbs.

gr.	Latit.		First.		Second		Third.		Fourth		diff.
	m.	Long.	diff.	Long.	diff.	Long.	diff.	Long.			
45	10	10 6	2 21	1	6 33	53	10 50	44	14		
	20	10 8	3 21	7	6 34	3	10 50	58	14		
	30	10 11	3 21	13	6 34	13	9 51	12	14		
	40	10 14	3 21	19	5 34	22	9 51	26	15		
	50	10 17	3 21	24	6 34	31	10 51	41	15		
46	00	10 20	2 21	30	6 34	41	10 51	56	14		
	10	10 22	3 21	36	6 34	51	10 52	10	14		
	20	10 25	3 21	42	6 35	1	10 52	24	15		
	30	10 28	3 21	48	6 35	11	9 52	39	14		
	40	10 31	3 21	54	6 35	20	10 52	53	14		
47	50	10 34	3 22	0	7 35	30	10 53	7	15		
	00	10 37	3 22	7	6 35	40	9 53	22	15		
	10	10 40	2 22	13	6 35	49	10 53	37	15		
	20	10 35	3 22	19	6 35	59	10 53	52	15		
	30	10 45	2 22	25	6 36	9	10 54	7	14		
48	40	10 48	3 22	31	6 36	19	10 54	21	15		
	50	10 51	4 22	37	6 36	29	10 54	36	15		
	00	10 55	3 22	43	6 36	39	10 54	51	15		
	10	10 58	3 22	49	7 36	49	10 55	6	15		
	20	11 1	3 22	56	6 36	59	10 55	21	15		
49	30	11 4	3 23	2	6 37	9	10 55	36	15		
	40	11 7	3 23	8	7 37	19	10 55	51	15		
	50	11 10	3 23	15	6 37	29	10 56	6	15		
	00	11 13	3 23	21	6 37	40	10 56	22	15		
	10	11 16	3 23	27	6 37	50	10 56	37	15		
50	20	11 19	3 23	33	6 38	0	10 56	52	15		
	30	11 22	3 23	39	6 38	10	10 57	8	15		
	40	11 25	3 23	45	7 38	20	10 57	33	15		
	50	11 28	3 23	52	7 38	30	11 57	38	15		
	00	11 31	3 23	59	6 38	41	10 57	45	15		

To find the Difference of Longitude.

Latit.		Fifth			Sixth			Seventh		
D	M.	Long.	diff.		Long.	diff.		Long.	diff.	
45	10	75	55	21	122	29	34	255	3	71
	20	76	16	22	123	3	34	256	14	72
	30	76	38	21	123	37	34	257	26	72
	40	76	59	22	124	11	35	258	38	72
	50	77	21	22	124	46	35	259	50	72
46	00	77	43	21	125	21	35	261	2	72
	10	78	4	21	125	56	35	262	14	73
	20	78	25	22	126	31	35	263	27	73
	30	78	47	22	127	6	35	264	40	73
	40	79	9	22	127	41	35	265	53	73
47	50	79	31	22	128	16	36	267	6	74
	00	79	53	22	128	52	35	268	20	74
	10	80	15	22	129	27	35	269	34	74
	20	80	37	22	130	2	36	270	48	75
	30	80	59	22	130	38	36	272	3	74
48	40	81	21	22	131	14	36	273	27	75
	50	81	43	22	131	50	36	274	32	75
	00	82	5	22	132	26	36	275	47	75
	10	82	27	23	133	2	36	277	2	75
	20	82	50	23	133	38	37	278	17	76
49	30	83	13	23	134	15	36	279	33	76
	40	83	35	23	134	51	37	280	49	77
	50	83	58	23	135	28	37	282	6	77
	00	84	21	23	136	5	36	283	23	76
	10	84	44	23	136	41	37	284	39	77
50	20	85	7	23	137	18	37	285	56	77
	30	85	30	23	137	55	37	287	18	78
	40	85	53	23	138	32	38	288	31	78
	50	86	16	24	139	10	38	289	49	78
	00	86	40	23	139	48	37	291	7	78

The second Table of Rumbs.

Latit.		First		Second		Third		fourth	
gr.	m.	Long.	diff.	Long.	diff.	Long.	diff.	Long.	diff.
50	10	11 34	3	24 6	7	38 51	11	58 9	16
	20	11 37	3	24 12	7	39 2	11	58 25	16
	30	11 40	4	24 19	7	39 13	10	58 41	16
	40	11 44	3	24 26	6	39 23	10	58 56	15
	50	11 47	3	24 32	6	39 32	11	59 12	16
51	00	11 50	3	24 38	7	39 44	10	59 25	16
	10	11 53	3	24 45	6	39 54	11	59 44	16
	20	11 56	4	24 51	7	40 5	11	60 0	16
	30	12 0	3	24 58	7	40 16	11	60 16	16
	40	12 3	3	25 5	7	40 27	11	60 32	16
52	50	12 6	3	25 12	6	40 38	11	60 48	17
	00	12 9	3	25 18	7	40 49	11	61 5	16
	10	12 12	3	25 25	7	41 0	11	61 21	16
	20	12 15	4	25 32	7	41 11	11	61 37	17
	30	12 19	3	25 39	6	41 22	11	61 54	16
53	40	12 22	3	25 45	7	41 33	11	62 10	17
	50	12 25	3	25 52	7	41 44	11	62 27	17
	00	12 28	4	25 59	7	41 55	11	62 44	16
	10	12 32	4	26 6	7	42 6	11	63 0	17
	20	12 36	3	26 13	7	42 17	11	63 17	17
54	30	12 39	3	26 20	7	42 28	11	63 34	16
	40	12 42	3	26 27	7	42 39	11	63 50	17
	50	10 45	4	26 34	7	42 50	12	64 7	17
	00	12 49	3	26 41	7	43 2	11	64 24	17
	10	12 52	4	26 48	7	43 41	11	64 41	17
55	20	12 56	3	26 55	7	43 24	11	64 58	18
	30	12 59	3	27 2	7	43 36	11	65 16	17
	40	13 2	4	27 9	7	43 47	12	65 33	17
	50	13 6	4	27 16	7	43 59	12	65 50	18
	00	13 10	5	27 23	7	43 11	11	66 8	17

To find the Difference of Longitude.

Latit.		Fifth			Sixth			Seventh		
D.	M.	Long.		diff.	Long.		diff.	Long.		diff.
50	10	87	3	23	140	25	38	292	25	78
	20	87	26	24	141	3	38	293	43	79
	30	88	50	23	141	41	38	295	2	79
	40	88	13	24	142	19	38	296	21	80
	50	88	37	24	142	57	38	297	41	80
51	00	89	1	23	143	35	38	298	1	80
	10	89	24	24	144	13	39	300	21	80
	20	89	48	24	144	52	39	301	41	81
	30	90	22	24	145	31	39	303	2	81
	40	90	36	24	146	10	39	304	23	81
	50	91	1	25	146	49	39	305	44	81
52	00	91	25	24	147	28	39	307	5	82
	10	91	49	24	148	7	39	308	27	82
	20	92	13	25	148	46	40	309	49	83
	30	92	38	25	149	26	40	311	12	82
	40	93	2	25	150	6	40	312	34	83
	50	93	27	25	150	46	40	313	57	83
53	00	93	52	25	151	26	40	315	20	84
	10	94	17	25	152	6	40	316	44	84
	20	94	42	26	152	46	41	318	8	85
	30	95	8	25	153	27	40	319	33	84
	40	95	33	25	154	7	41	320	57	85
	50	96	58	25	154	48	41	322	22	85
54	00	96	23	25	155	29	41	323	47	86
	10	96	48	26	156	10	41	325	13	86
	20	97	14	26	156	51	42	326	39	87
	30	97	40	26	157	33	42	328	6	87
	40	98	6	26	158	15	42	329	33	87
	50	98	32	26	158	57	42	331	0	87
55	00	98	58	26	159	39	42	332	27	88

The second Table of Rumbs.

Latit.		First		Second		Third		Fourth		
D.	M.	Long.	diff.	Long.	diff.	Long.	diff.	Long.	diff.	
55	10	13	13	327	20	844	22	1367	25	17
	20	13	16	427	38	744	34	1467	42	18
	30	13	20	327	45	744	46	1467	0	18
	40	13	23	427	52	844	58	1357	18	18
	50	13	27	328	0	745	10	1467	36	18
56	00	13	30	328	7	845	22	1367	54	18
	10	13	30	428	15	845	34	1468	12	18
	20	13	37	428	23	745	46	1468	30	18
	30	13	41	328	30	745	58	1468	48	18
	40	13	44	428	37	846	10	1469	6	18
	50	13	48	428	45	746	22	1569	24	18
57	00	13	52	438	52	846	35	1469	42	18
	10	13	56	429	0	846	41	1470	0	19
	20	14	0	329	8	746	59	1470	19	19
	30	14	3	429	15	847	12	1570	38	18
	40	14	7	429	23	847	24	1570	56	19
	50	14	11	329	31	747	36	1571	15	19
58	00	14	14	429	38	847	42	1471	34	19
	10	14	18	429	46	848	1	1571	53	19
	20	14	22	429	54	848	14	1572	12	19
	30	14	26	330	2	848	27	1572	31	19
	40	14	29	430	10	848	40	1572	50	19
	50	14	33	430	18	848	52	1573	9	20
59	00	14	37	430	26	949	6	1573	29	19
	10	14	41	430	35	849	19	1573	48	19
	20	14	44	430	43	849	32	1674	7	20
	30	14	48	430	51	849	45	1674	27	20
	40	14	52	430	59	849	58	1674	47	20
	50	14	56	431	7	850	11	1675	7	20
60	00	15	0	431	15	950	25	1575	27	20

To find the of Difference Longitude.

Latit.		Fifth.		diff.	Sixth.		diff.	Seventh		diff.
D.	M.	Long.			Long.			Long.		
55	10	99	24	26	160	21	42	333	55	88
	20	99	50	27	161	3	43	335	23	89
	30	100	17	26	161	46	43	336	52	89
	40	100	43	27	162	29	43	338	21	89
	50	101	10	27	163	12	43	339	50	89
56	00	101	37	27	163	55	43	341	19	90
	10	102	4	27	164	38	43	342	49	91
	20	102	31	27	165	21	44	344	20	91
	30	102	58	27	166	5	44	345	51	91
	40	103	25	27	166	49	44	347	22	92
	50	103	52	27	166	33	45	348	54	92
57	00	104	19	27	167	18	44	350	26	93
	10	104	46	28	168	2	44	351	59	93
	20	105	14	28	169	46	45	353	32	93
	30	105	42	28	170	31	45	355	5	94
	40	106	10	28	171	16	45	356	39	94
	50	106	38	28	172	1	46	358	13	94
58	00	107	7	28	172	47	45	359	47	95
	10	107	35	28	173	32	46	361	22	96
	20	108	3	29	174	18	46	362	58	96
	30	108	32	28	175	4	46	364	34	97
	40	109	0	29	175	50	47	366	11	97
	50	109	29	29	176	37	47	367	48	97
59	00	109	58	29	177	24	47	369	25	98
	10	110	27	29	178	11	48	371	3	98
	20	110	56	30	178	58	48	372	51	99
	30	111	26	29	179	46	48	374	20	99
	40	111	55	30	180	34	48	375	59	100
	50	112	25	30	181	22	48	377	39	100
60	00	112	55	30	182	10	48	379	19	101

The second Table of Rumbs.

Latit.		First		Second		Third		Fourth			
D.	M.	Long.		diff.	Long.	diff.	Long.	diff.	Long.	diff.	
60	10	15	4	431	24	850	38	13	75	47	20
	20	15	8	431	32	950	51	14	75	7	20
	30	15	12	431	41	851	5	14	76	27	20
	40	15	16	431	49	851	19	15	76	47	21
	50	15	20	531	57	851	33	14	77	8	21
61	00	15	25	432	7	951	47	15	77	29	21
	10	15	29	432	14	952	0	14	77	49	21
	20	15	33	432	23	952	14	14	78	10	21
	30	15	37	432	32	952	28	14	78	31	21
	40	15	41	532	41	852	42	14	78	52	21
62	50	15	46	432	49	952	56	15	79	13	21
	00	15	50	432	58	953	11	14	79	34	21
	10	15	54	433	7	953	25	14	79	55	22
	20	15	58	533	16	953	39	14	80	17	22
	30	16	3	433	25	953	53	15	80	39	22
63	40	16	7	533	34	954	8	15	81	1	22
	50	16	12	433	43	954	23	15	81	23	22
	00	16	16	433	52	954	38	14	81	45	22
	10	16	20	534	1	954	52	15	82	7	22
	20	16	25	434	10	955	7	15	82	29	22
64	30	16	29	534	19	955	22	15	82	51	22
	40	16	34	434	28	1055	37	15	83	13	23
	50	16	38	534	38	955	52	15	83	36	23
	00	16	43	434	47	1056	7	15	83	59	23
	10	16	47	534	57	1056	23	15	84	22	23
65	20	16	52	435	7	956	37	16	84	45	23
	30	16	56	535	16	1056	53	16	85	8	23
	40	17	1	435	26	1057	9	16	85	31	23
	50	17	5	535	36	957	25	16	85	54	24
	00	17	10	535	45	1057	41	15	86	18	24

To find the Difference of Longitude.

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diff.	Latit.		Fifth			Sixth			Seventh		
	D.	M.	Long.		diff.	Long.		diff.	Long.		diff.
20	60	10	113	25	30	182	58	48	381	0	101
20		20	113	55	31	183	46	49	382	41	102
20		30	114	26	30	184	35	49	384	25	102
21		40	114	56	31	185	24	50	386	5	103
21		50	115	27	31	186	14	50	387	48	103
21	61	00	115	58	31	187	4	50	389	31	104
21		10	116	29	31	187	54	50	391	15	105
21		20	117	0	31	188	44	50	393	0	105
21		30	117	31	31	189	34	51	394	45	106
21		40	118	2	31	190	25	51	396	31	106
21	62	50	119	33	32	191	16	51	398	18	107
21		00	119	5	32	192	7	51	400	4	108
22		10	119	37	32	192	58	52	401	52	108
22		20	120	9	33	193	50	52	403	40	108
22		30	120	42	33	194	42	52	405	28	109
22	63	40	121	14	33	195	34	53	407	17	109
22		50	121	47	33	196	27	53	409	6	110
22		00	122	20	33	197	20	53	410	56	112
22		10	122	53	33	198	13	54	412	48	112
22		20	123	26	34	199	7	54	414	40	112
23	64	30	124	0	33	200	1	54	416	30	113
23		40	124	33	34	200	55	55	418	25	114
23		50	125	7	34	201	50	55	420	19	114
23		00	125	41	34	202	45	55	422	13	115
23		10	126	15	35	203	40	56	424	48	116
23	65	20	127	50	35	204	36	56	426	4	116
23		30	127	25	35	205	32	56	428	0	117
23		40	128	0	35	206	28	57	429	57	118
24		50	128	35	35	207	25	57	431	55	118
24		00	129	10	35	208	22	57	435	53	119

The second Table of Rumbs.

Nautical Table of Numbers.											
Latit.		First.		Second		Third		Fourth			
D.	M.	Long.		diff.	Long.	diff.	Long.	diff.	Long.	diff.	
65	10	17	15	4	35	55	10	57	56	16	86
	20	17	19	5	36	5	10	58	12	16	87
	30	17	24	5	36	15	10	58	28	16	87
	40	17	29	5	36	25	10	58	44	16	87
	50	17	34	5	36	35	10	59	0	17	88
66	00	17	39	4	36	45	10	59	17	16	88
	10	17	43	5	36	55	11	59	33	16	89
	20	17	48	5	37	6	10	59	49	17	89
	30	17	53	5	37	16	10	60	6	17	89
	40	17	58	5	37	26	11	60	23	17	90
	50	18	3	5	37	37	11	60	40	18	90
67	00	18	8	5	37	48	10	60	58	17	91
	10	18	13	6	37	58	11	61	15	17	91
	20	18	19	5	38	9	11	61	32	17	92
	30	18	24	6	38	20	11	61	49	18	92
	40	18	30	5	38	31	11	62	7	18	92
	50	18	35	5	38	42	11	62	25	18	93
68	00	18	40	5	38	53	11	62	43	17	93
	10	18	45	6	39	4	11	63	9	18	94
	20	18	51	6	39	15	11	63	18	18	94
	30	18	57	5	39	26	12	63	36	18	95
	40	19	3	5	39	38	11	63	54	19	95
	50	19	7	6	39	49	11	64	13	19	96
69	00	19	13	5	40	0	12	64	32	19	96
	10	19	18	6	40	12	12	64	50	19	97
	20	19	24	5	40	24	11	65	9	19	97
	30	19	29	6	40	35	12	65	28	19	97
	40	19	35	6	40	47	11	65	47	19	98
	50	19	41	6	40	8	12	66	6	20	98
70	00	19	47	6	41	10	12	66	26	20	99

To find the Difference of Longitude.

To find the Difference										
Latit.		Fifth			Sixth			Seventh		
D.	M.	Long.		diff.	Long.		diff.	Long.		diff.
65	10	139	45	36	209	19	58	435	53	120
	20	130	21	36	210	17	58	437	53	121
	30	130	57	36	211	15	58	439	54	122
	40	131	33	36	212	13	59	441	56	122
	50	132	9	37	213	12	59	443	58	123
66	00	133	46	37	214	11	60	446	61	124
	10	133	23	37	215	11	60	448	5	125
	20	134	0	38	216	11	60	450	10	125
	30	134	38	38	217	11	61	452	15	126
	40	135	16	38	218	12	61	454	21	127
67	50	135	54	38	219	13	61	456	28	128
	00	136	32	38	220	14	62	458	37	129
	10	137	10	39	221	16	62	460	46	130
	20	137	49	39	222	18	63	462	56	131
	30	138	28	39	223	21	63	463	7	132
68	40	139	7	39	224	24	64	467	19	133
	50	139	46	40	225	28	64	469	32	134
	00	140	26	40	226	32	65	471	46	135
	10	141	6	41	227	37	65	474	1	136
	20	141	47	41	228	41	66	476	37	137
69	30	142	28	41	229	48	66	478	33	138
	40	143	9	41	230	54	67	480	51	138
	50	143	50	41	231	1	67	483	9	139
	00	144	31	42	232	8	68	485	28	141
	10	145	13	42	234	16	69	487	49	142
70	20	145	55	43	235	24	69	490	31	143
	30	146	38	43	236	32	69	493	54	144
	40	147	21	43	237	41	70	494	58	145
	50	148	4	43	238	51	70	497	23	146
	00	148	47	44	240	3	71	499	49	148

The second Table of Rumbs.

Latit		First		Second		Third		Fourth	
D.	M.	Long.	diff	Long.	diff	Long.	diff	Long.	diff
70	10	19 53	6 41	23	12 66	45	19 99	54	30
	20	19 39	5 41	35	13 67	5	20 100	24	30
	30	20 4	6 41	48	12 67	25	20 100	54	30
	40	20 10	6 42	0	13 67	45	20 101	24	30
	50	20 16	6 42	13	12 68	5	21 101	54	31
	00	20 22	6 42	25	13 68	26	20 102	25	31
71	10	20 28	6 42	38	13 68	46	21 102	56	31
	20	20 34	7 42	51	13 69	7	21 103	27	31
	30	20 41	6 43	4	13 69	28	21 103	58	32
	40	20 57	6 43	17	13 69	49	21 104	30	32
	50	20 53	7 43	20	14 70	10	22 105	2	32
	00	21 0	6 43	44	13 70	32	22 105	34	32
72	10	21 6	6 43	57	13 70	54	22 106	6	33
	20	21 12	7 44	10	14 71	16	22 106	39	33
	30	21 19	7 44	24	14 71	38	22 107	12	34
	40	21 26	7 44	38	14 72	0	23 107	46	34
	50	21 33	7 44	52	14 72	22	23 108	20	34
	00	21 40	6 45	6	14 72	46	23 108	54	34
73	10	21 46	7 45	20	14 73	9	23 109	28	35
	20	21 53	7 45	34	15 73	32	23 110	3	35
	30	22 0	7 45	49	15 73	55	24 110	38	35
	40	22 7	7 46	4	15 74	19	24 111	13	36
	50	22 14	7 46	19	15 74	43	24 111	49	36
	00	22 21	8 46	34	15 75	7	25 112	25	36
74	10	22 29	7 46	49	15 75	32	24 113	1	37
	20	22 36	8 47	4	16 75	56	25 113	38	38
	30	22 44	7 47	20	15 76	21	25 114	15	38
	40	22 51	8 47	35	16 76	46	25 114	53	38
	50	22 59	7 47	51	16 78	11	26 115	31	38
	00	22 6	8 48	7	16 78	37	26 116	9	38

To find the Difference of Longitude.

Latit.		Fifth			Sixth			Seventh		
D.	M.	Long.		diff.	Long.		diff.	Long.		diff.
70	10	149	31	44	241	12	72	502	17	149
	20	150	15	45	242	24	72	504	46	150
	30	151	0	45	243	36	73	507	16	151
	40	151	45	46	244	49	73	509	47	152
	50	152	31	46	246	2	74	512	19	154
71	00	153	17	46	247	16	74	514	53	155
	10	154	3	46	248	30	75	517	28	156
	20	154	49	47	249	45	76	520	4	158
	30	155	36	48	251	1	76	522	42	159
	40	156	24	48	252	17	77	525	21	161
72	50	157	12	48	253	34	78	528	2	162
	00	148	0	49	254	52	78	530	44	163
	10	158	49	49	256	10	79	533	27	165
	20	159	38	49	257	29	80	536	12	166
	30	160	27	40	258	49	81	538	58	168
73	40	161	17	50	260	10	82	541	46	170
	50	162	7	51	261	32	82	544	36	171
	00	162	58	51	262	54	83	547	27	173
	10	163	49	52	264	17	84	550	20	174
	20	164	41	53	265	41	84	553	14	176
74	30	165	34	53	267	5	85	556	10	178
	40	166	27	54	268	35	86	559	8	180
	50	167	21	54	270	56	87	562	8	181
	00	168	15	55	271	23	88	565	9	183
	10	169	10	55	272	52	89	568	12	185
75	20	169	55	55	274	20	90	571	17	187
	30	171	0	56	275	50	91	574	24	189
	40	171	56	57	277	21	92	577	33	191
	50	172	53	57	278	53	93	580	44	193
	00	173	50	58	280	26	94	583	58	196

The first Year after Leap Years.

Sun's Declination 1697, 1701, 1705, 1709.

Days	Janua.		February.		March		April		May		June	
	South		South		South		South		North		North	
1	21	42	13	44	3	23	8	3	18	6	23	11
2	21	37	13	24	2	59	8	59	18	21	23	15
3	21	22	13	4	2	35	9	21	18	35	23	18
4	21	11	12	44	2	12	9	42	18	50	23	21
5	21	2	12	23	1	48	10	13	19	4	23	23
6	20	48	12	2	1	24	10	35	19	18	23	26
7	20	36	11	41	1	1	10	46	19	31	23	27
8	20	24	11	19	0	47	11	7	19	44	23	29
9	20	11	10	58	0	13	11	27	19	57	23	29
10	19	57	10	36	Nor. 11		11	48	20	10	23	30
11	19	44	10	15	0	34	12	8	20	22	23	30
12	19	30	9	53	0	58	12	28	20	33	23	30
13	19	16	9	31	1	21	12	48	20	45	23	29
14	19	1	9	8	1	45	13	8	20	56	23	28
15	18	46	8	46	2	9	13	27	21	7	23	26
16	18	31	8	24	2	32	13	46	21	17	23	24
17	18	15	8	1	2	55	14	6	21	27	23	22
18	17	59	7	56	3	19	14	24	21	37	23	19
19	17	43	7	15	3	42	14	43	21	46	23	16
20	17	26	6	52	4	5	15	1	21	55	23	12
21	17	9	6	29	4	29	15	19	22	3	23	8
22	16	52	6	6	4	52	15	37	22	11	23	3
23	16	34	5	43	5	15	15	55	22	19	23	58
24	16	16	5	20	5	38	16	12	22	26	22	53
25	15	58	4	57	6	0	16	29	22	33	22	48
26	15	40	4	33	6	23	16	56	2	50	22	41
27	15	21	4	10	6	46	17	2	22	46	22	35
28	15	52	3	46	7	8	17	19	22	52	22	28
29	14	43			7	31	17	35	22	57	22	21
30	14	24			7	53	17	50	23	2	22	13
31	14	0			8	15		23		7		

The first Year after Leap-Year

Sun's Declination 1697, 1701, 1705, 1709.

Days	July		August		Septem.		October		Novem.		Decemb.	
	North		North		North		South		South		South	
1	22	5	15	9	4	20	7	18	17	42	23	8
2	21	57	14	50	3	57	7	41	17	58	23	12
3	21	48	14	32	3	34	7	3	18	14	23	16
4	21	39	14	13	3	11	8	26	18	29	23	19
5	21	30	13	55	2	48	8	48	18	44	23	22
6	21	20	13	36	2	24	9	10	18	53	23	25
7	21	10	13	16	2	1	9	32	19	14	23	27
8	20	59	12	57	1	38	9	54	19	28	23	28
9	20	48	12	37	1	13	10	16	19	42	23	29
10	20	37	12	17	0	51	10	38	19	56	23	30
11	20	25	11	57	0	27	10	59	20	9	23	30
12	20	13	11	37	0	4	11	21	20	22	23	30
13	20	1	11	17	Sou. 20		11	42	20	34	23	29
14	19	48	10	56	0	43	12	3	20	46	23	28
15	19	35	10	35	1	7	12	23	20	58	23	26
16	19	22	10	14	1	30	12	44	21	9	23	23
17	19	8	9	53	1	54	13	4	21	20	23	21
18	18	54	9	32	2	17	13	24	21	31	23	17
19	18	40	9	10	2	41	13	41	21	44	23	14
20	18	25	8	49	3	4	14	4	21	50	23	10
21	18	11	8	27	3	27	14	34	21	0	23	5
22	17	56	8	5	3	51	14	43	22	8	23	0
23	17	40	7	43	4	14	15	2	22	17	22	54
24	17	24	7	21	4	37	15	21	22	25	22	48
25	17	8	7	59	5	1	15	39	22	32	22	42
26	16	32	6	36	5	24	15	58	22	39	22	35
27	16	35	6	14	5	47	16	16	22	46	22	28
28	16	19	5	51	6	10	16	33	22	52	22	20
29	16	51	5	29	6	33	16	51	22	58	22	12
30	15	44	5	6	6	56	17	8	23	3	22	3
31	15	27	4	43			17	22			21	54

The Second Year after Leap Year.

Sun's Declination 1698, 1702, 1706, 1710

Days	Janua		Februar		March		April		May		June	
	South		South		South		South		North		North	
1	21	45	13	49	3	28	8	32	18	2	23	10
2	21	35	13	29	3	5	8	54	18	1	23	14
3	21	24	13	9	2	45	9	15	18	32	23	17
4	21	14	12	49	2	17	9	37	18	46	23	20
5	21	2	12	28	1	54	10	58	19	0	23	23
6	20	51	12	7	1	3	10	20	19	14	23	25
7	20	39	11	46	1	6	10	41	19	28	23	27
8	20	27	11	25	0	43	11	2	19	41	23	28
9	20	14	11	3	0	10	11	22	19	54	23	29
10	20	1	10	42	Nor. 5		11	43	20	7	23	30
11	19	47	10	20	0	28	12	4	20	19	23	30
12	19	33	10	58	0	52	12	23	20	31	23	30
13	19	19	9	36	1	16	12	43	20	42	23	29
14	19	5	9	14	1	39	13	3	20	53	23	28
15	18	50	8	52	2	3	13	23	21	4	23	26
16	18	34	8	29	2	26	13	42	21	15	23	25
17	18	19	8	6	2	50	14	1	21	25	23	22
18	18	3	7	44	3	15	14	20	21	34	23	19
19	17	47	7	21	3	37	14	38	21	44	23	16
20	17	30	6	58	4	0	14	57	21	53	23	13
21	17	13	6	35	4	23	15	15	21	1	23	9
22	16	56	6	12	4	46	15	33	22	9	23	4
23	16	39	5	49	5	9	15	51	22	17	23	0
24	16	21	5	26	5	42	16	8	22	25	22	54
25	16	3	5	2	5	55	16	25	22	32	22	49
26	15	44	4	39	6	18	16	42	22	38	22	43
27	15	26	4	15	6	40	16	58	22	45	22	37
28	15	7	3	52	7	3	17	15	22	51	22	30
29	14	48			7	45	17	31	22	56	22	23
30	14	29			7	48	17	46	23	1	22	13
31	14	5			8	10			23	6		

The second Year after Leap-Year
Sun's Declination 1698, 1692, 1706, 1710.

Days	July		August		Septem.		October		Novem.		Decemb.	
	North		North		North		South		South		South	
1	22	7	15	13	4	20	7	13	17	37	23	7
2	21	59	14	55	4	3	7	35	17	54	23	11
3	21	50	14	37	3	40	7	58	18	10	23	15
4	21	41	14	18	3	16	8	21	18	25	23	19
5	21	32	13	59	2	53	8	43	18	41	23	22
6	21	22	13	40	2	30	9	5	18	56	23	24
7	21	12	13	21	1	7	9	27	19	11	23	26
8	21	2	13	2	1	43	9	49	19	25	23	28
9	20	51	12	42	1	20	10	11	19	39	23	29
10	20	40	12	22	1	57	10	32	19	53	23	30
11	20	28	12	2	0	33	10	54	20	6	23	30
12	20	16	11	42	0	10	11	15	20	14	23	30
13	20	4	11	22	Sou. 14		11	37	20	31	23	29
14	19	51	11	1	0	37	11	58	20	43	23	28
15	19	38	10	40	1	1	12	18	20	55	23	26
16	19	25	10	19	1	24	12	39	21	7	23	24
17	19	12	9	56	1	48	12	59	21	18	23	21
18	18	58	9	37	2	11	13	20	21	28	23	18
19	18	44	9	16	2	35	13	40	21	38	23	15
20	18	29	8	54	2	58	13	59	21	48	23	11
21	18	14	8	32	3	22	14	19	21	58	23	6
22	17	59	8	10	3	45	14	38	22	6	23	1
23	17	44	7	48	4	98	14	57	22	15	22	56
24	17	28	7	26	4	32	15	16	22	23	22	50
25	17	12	7	4	4	55	15	35	22	30	22	44
26	16	55	6	42	5	18	15	53	22	38	22	37
27	16	39	6	19	5	41	16	11	22	44	22	30
28	16	23	5	57	6	4	16	29	22	51	22	22
29	16	6	5	34	6	27	16	47	22	56	22	14
30	15	48	5	14	6	50	17	4	23	2	22	5
31	15	31	4	49			17	21			21	56

The third Year after Leap Year.

Sun's Declination 1699, 1703, 1707, 1711.

Days	Janua		Februar.		March		April		May		June	
	South		South		South		North		North		North	
1	21	47	13	54	3	34	8	26	17	58	23	9
2	21	37	13	34	3	10	8	48	18	13	23	13
3	21	27	13	14	2	47	9	10	18	28	23	16
4	21	16	12	54	2	23	9	32	18	43	23	20
5	21	5	12	33	1	59	9	53	18	57	23	22
6	20	54	12	11	1	36	10	14	19	11	23	24
7	20	42	11	51	1	12	10	36	19	25	23	27
8	20	30	11	30	0	48	10	56	19	38	23	28
9	20	17	11	9	0	25	11	17	19	51	23	29
10	20	4	10	47	0	1	11	28	20	4	23	30
11	19	51	10	25	Nor. 23		11	58	20	16	23	30
12	19	43	10	5	0	46	12	18	20	28	23	30
13	19	23	9	41	1	10	12	38	20	38	23	29
14	19	8	9	19	1	34	12	58	20	50	23	28
15	18	53	8	57	1	57	13	18	21	2	23	27
16	18	38	8	35	2	21	13	37	21	12	23	23
17	18	23	8	12	2	44	13	56	21	22	23	21
18	18	7	7	49	3	8	14	15	21	32	23	20
19	17	51	7	27	3	31	14	34	21	41	23	17
20	17	34	7	4	3	54	14	52	21	50	23	14
21	17	17	6	41	4	17	15	11	21	59	3	10
22	17	0	6	58	4	41	15	29	22	7	23	6
23	16	43	5	54	5	4	15	46	22	15	23	1
24	16	25	5	31	5	27	16	4	22	23	23	56
25	16	7	5	0	5	49	16	21	22	30	22	50
26	15	49	4	44	6	12	16	33	22	37	22	44
27	15	35	4	21	6	35	16	54	22	43	22	38
28	15	12	3	58	6	57	17	11	22	49	22	32
29	14	53			7	20	17	27	22	55	22	25
30	14	33			7	42	17	43	23	0	22	17
31	14	14			8	4			23	5		

Sun's Declination 1699, 1703, 1707, 1711.

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Days	July		August		Septemb		October.		November		Decemb.	
	North		North		North		South		South		South	
1	ZZ	9	15	17	4	31	7	7	17	33	Z3	5
2	ZI	1	14	59	3	8	7	30	17	50	Z3	10
3	ZI	53	14	41	3	45	7	53	18	6	Z3	14
4	ZI	44	14	23	3	22	8	15	18	22	Z3	18
5	ZI	34	14	4	Z	59	8	37	18	37	Z3	21
6	ZI	25	13	45	Z	36	9	0	18	52	Z3	24
7	ZI	15	13	26	I	12	9	22	19	7	Z3	26
8	ZI	4	13	6	I	49	9	44	19	21	Z3	28
9	ZO	53	12	44	I	26	10	6	19	36	Z3	29
10	ZO	42	12	27	I	2	10	27	19	49	Z3	30
11	ZO	31	12	7	0	39	10	49	ZO	3	Z3	30
12	ZO	19	11	47	0	15	11	10	ZO	16	Z3	30
13	ZO	7	11	27	Sou.	8	11	31	ZO	28	Z3	29
14	19	54	11	6	0	32	11	52	ZO	40	Z3	28
15	19	42	10	45	0	55	12	13	ZO	52	Z3	27
16	19	28	10	24	I	19	12	34	ZI	4	Z3	24
17	19	15	10	3	I	42	12	54	ZI	15	Z3	22
18	19	1	9	42	Z	6	13	15	ZI	26	Z3	19
19	18	47	9	21	Z	29	13	35	ZI	36	Z3	16
20	18	33	8	59	Z	53	13	55	ZI	46	Z3	12
21	18	18	8	38	3	16	14	14	ZI	55	Z3	7
22	18	3	8	16	3	39	14	35	Z2	4	ZZ	2
23	17	48	7	54	4	3	14	53	Z2	13	ZZ	57
24	17	33	7	32	4	26	15	12	Z2	21	ZZ	51
25	17	16	7	10	5	49	15	30	Z2	29	ZZ	45
26	16	0	6	47	5	13	15	49	Z2	36	Z2	39
27	16	43	6	25	5	36	16	7	Z2	43	Z2	31
28	16	27	6	2	5	59	16	24	Z2	49	Z2	24
29	16	10	5	40	6	22	16	42	Z2	55	Z2	16
30	15	53	5	17	6	45	17	0	Z3	0	Z2	7
31	15	35	4	54			17	17			ZI	59

The Leap Years.

Sun's Declination 1696, 1700, 1704, 1708.

Days	Janua		F. leuar.		South		April		May		June	
	South		South		March		South		North		North	
1	21	49	13	59	3	16	8	43	18	10	23	12
2	21	39	13	39	2	52	9	5	18	25	23	15
3	21	29	13	19	2	29	9	26	18	39	23	19
4	21	19	12	59	2	5	9	48	18	74	23	22
5	21	8	12	38	1	42	10	5	19	8	23	24
6	20	56	12	17	1	18	10	30	19	21	23	26
7	20	45	11	56	1	54	10	41	19	35	23	28
8	20	33	11	35	0	30	11	12	19	48	23	29
9	20	20	11	14	0	7	11	33	20	1	23	30
10	20	27	10	52	Nor. 17		11	53	20	13	23	30
11	19	54	10	31	0	41	11	14	20	25	23	30
12	19	40	10	9	1	4	12	34	20	37	23	29
13	19	26	9	47	1	28	12	53	20	48	23	28
14	19	12	9	25	1	51	13	13	20	59	23	27
15	18	57	9	2	2	15	13	33	21	10	23	25
16	18	42	8	40	2	38	13	52	21	20	23	23
17	18	26	8	17	3	2	14	11	21	30	23	21
18	18	13	7	55	3	25	14	29	21	39	23	18
19	17	55	7	32	3	48	14	48	21	48	23	15
20	17	38	7	9	4	12	15	6	21	57	23	11
21	17	21	6	46	4	35	15	24	21	6	23	7
22	17	4	6	23	4	58	15	42	22	13	23	2
23	16	47	6	0	5	21	15	59	22	21	23	57
24	16	30	5	37	5	44	16	17	22	28	22	52
25	16	12	5	14	6	7	16	34	22	35	22	46
26	15	53	4	50	6	29	16	50	22	42	22	40
27	15	35	4	27	6	52	17	7	22	48	22	33
28	15	16	4	3	7	14	17	23	22	53	22	26
29	14	57	3	40	7	31	17	39	22	57	22	19
30	14	38			7	59	17	54	23	3	22	11
31	14	11			8	21			23	8		

Sun's Declination 1696, 1700, 1704, 1708.

Day	July		August		Septemb.		October.		Novemb.		Decemb.	
	North		North		North		South		South		South	
1	ZI	3	15	4	4	14	7	25	18	9	Z3	9
2	ZI	55	14	45	3	51	7	47	18	13	Z3	13
3	ZI	46	14	27	3	28	8	10	18	17	Z3	17
4	ZI	37	14	8	3	4	8	32	18	20	Z3	20
5	ZI	27	13	49	Z	41	8	54	18	23	Z3	23
6	ZI	17	13	30	Z	18	9	16	19	3	Z3	25
7	ZI	7	13	11	I	55	9	38	19	18	Z3	27
8	ZO	56	12	52	I	31	10	9	19	32	Z3	29
9	ZO	45	12	32	I	08	10	22	19	46	Z3	29
10	ZO	34	12	12	O	44	10	44	19	59	Z3	30
11	ZO	22	11	52	O	21	11	5	ZO	13	Z3	30
12	ZO	10	11	31	Sou.	30	11	26	ZO	25	Z3	29
13	I9	57	11	11	O	26	11	47	ZO	38	Z3	28
14	I9	45	10	50	O	50	12	8	ZO	50	Z3	27
15	I9	31	10	29	O	13	12	29	ZO	1	Z3	25
16	I9	18	10	8	I	37	12	49	ZI	12	Z3	23
17	I9	4	9	47	Z	0	13	10	ZI	22	ZZ	20
18	I8	50	9	26	Z	24	13	30	ZI	33	ZZ	26
19	I8	36	9	4	Z	47	13	50	ZI	43	ZZ	13
20	I8	21	8	43	3	10	14	9	ZI	53	Z2	8
21	I8	7	8	21	3	34	14	29	22	2	ZZ	4
22	I7	51	7	59	3	57	14	48	22	11	ZZ	58
23	I7	36	7	37	4	20	15	7	22	19	ZZ	53
24	I7	20	7	15	4	44	15	26	22	27	ZZ	47
25	I7	4	6	53	5	7	15	44	22	34	ZZ	40
26	I6	47	6	30	5	30	16	2	22	41	Z2	33
27	I6	31	6	8	5	53	16	20	12	48	Z2	26
28	I6	14	5	45	6	16	16	38	22	54	Z2	18
29	I5	57	5	23	6	39	16	55	22	59	Z2	9
30	I5	39	5	0	7	2	17	12	23	4	Z2	1
31	I5	22	4	37			17	29		21		52

A Table of the Sun's Right-Ascension.

Days.	January		February		March		April		May		June	
	Ascensu H. M.		Ascensu H. M.		Ascensu H. M.		Ascensu H. M.		Ascensu H. M.		Ascensu H. M.	
1	19	35	21	42	23	28	1	21	3	14	5	19
2	19	39	21	46	23	32	1	25	3	18	5	23
3	19	43	21	50	23	36	1	29	3	22	5	27
4	19	47	21	54	23	39	1	33	3	26	5	31
5	19	51	21	58	23	43	1	36	3	30	5	36
6	19	56	22	2	23	46	1	40	3	34	5	40
7	20	0	22	6	23	50	1	44	3	38	5	44
8	20	4	22	10	23	53	1	47	3	42	5	48
9	20	9	22	14	23	57	1	51	3	46	5	52
10	20	13	22	17	0	1	1	54	3	50	5	59
11	20	17	22	21	0	5	1	58	3	54	6	0
12	20	22	22	25	0	8	2	2	3	58	6	4
13	20	26	22	29	0	12	2	6	4	2	6	8
14	20	30	22	33	0	15	2	10	4	6	6	12
15	20	34	22	36	0	19	2	12	4	10	6	17
16	20	38	22	40	0	23	2	17	4	14	6	21
17	20	42	22	44	0	26	2	21	4	18	6	25
18	20	46	22	48	0	30	2	25	4	22	6	29
19	20	50	22	52	0	33	2	29	4	26	6	33
20	20	54	22	55	0	37	2	32	4	30	6	38
21	20	58	22	59	0	41	2	36	4	34	6	42
22	21	3	23	3	0	44	2	40	4	38	6	46
23	21	7	23	6	0	48	2	44	4	42	6	50
24	21	11	23	10	0	52	2	48	4	46	6	54
25	21	15	23	13	0	55	2	51	4	50	6	58
26	21	19	23	17	0	59	2	55	4	54	7	2
27	21	23	23	21	1	3	2	59	4	58	7	9
28	21	27	23	25	1	6	3	3	5	2	7	10
29	21	31			1	10	3	7	5	6	7	14
30	21	35			1	14	3	10	5	11	7	19
31	21	38			1	17			5	15	7	

A Table of the Sun's Right-Ascension:

Days	July		August		Septem.		October		Novem.		Decemb.	
	Ascensu		Ascensu		Ascensu		Ascensu		Ascensu		Ascensu	
	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.	H.	M.
1	7	23	9	25	11	19	13	8	15	7	17	15
2	7	27	9	29	11	23	13	12	15	11	17	20
3	7	31	9	33	11	26	13	15	15	15	17	25
4	7	35	9	37	11	30	13	19	15	19	17	29
5	7	39	9	40	11	33	13	22	15	23	17	34
6	7	43	9	44	11	37	13	26	15	26	17	38
7	7	47	9	48	11	41	13	30	15	31	17	42
8	7	51	9	51	11	44	13	34	15	36	17	47
9	7	55	9	55	11	48	13	38	15	40	17	51
10	7	59	9	58	11	51	13	41	15	45	17	56
11	8	3	10	2	11	55	13	45	15	49	18	0
12	8	7	10	6	11	59	13	49	15	53	18	5
13	8	11	10	10	12	2	13	53	15	58	18	9
14	8	15	10	14	12	6	13	57	16	2	18	14
15	8	19	10	17	12	9	14	0	16	7	18	19
16	8	23	10	21	12	13	14	4	16	11	18	24
17	8	27	10	25	12	17	14	8	16	15	18	28
18	8	31	10	28	12	20	14	12	16	19	18	33
19	8	35	10	32	12	24	14	16	16	23	18	37
20	8	39	10	35	12	27	14	20	16	28	18	41
21	8	43	10	39	12	31	14	24	16	32	18	45
22	8	47	10	43	12	35	14	28	16	36	18	49
23	8	51	10	46	12	38	14	32	16	40	18	54
24	8	55	10	50	12	42	14	36	16	44	18	58
25	8	58	10	53	12	45	14	39	16	49	19	3
26	9	2	10	57	12	49	14	43	16	53	19	7
27	9	6	11	1	12	53	14	47	16	57	19	11
28	9	10	11	4	13	57	14	51	17	2	19	16
29	9	14	11	8	13	1	14	55	17	6	19	20
30		17	11	11	13	4	14	59	17	11	19	25
31		21	11	15			15	3			20	30

*The Declination and Right-Ascension of the Stars,
Calculated for twenty Years yet to come.*

N A M E S.	Right-Ascensi.		Declina- tion.		Distance from Po.	
	H.	M.	H.	M.	D.	M.
Bull's-Eye	4	10	15	48	N	74 12
Arcturus	14	1	29	58	N	69 2
Lyra	18	25	38	30	N	51 30
Medusa's Head <i>Algol</i>	2	47	39	39	N	50 21
The Goat <i>Capella</i>	4	52	45	37	N	44 23
Lion's Heart <i>Regulus</i>	9	39	13	33	N	76 27
Lions's Tale	11	32	16	25	N	73 35
Virgin's Spike	13	4	9	31	S	80 29
Scorpion's Heart	16	9	25	37	S	64 23
Fomohant	22	39	37	17	S	52 43
Left-foot of Orion	4	59	8	37	S	81 23
1. In Orion's Girdle	5	3	0	35	S	89 25
2. In Orion's Girdle	5	19	1	26	S	88 34
3. In Orion's Girdle	5	24	2	9	S	87 51
Great-Dog <i>Sirius</i>	6	31	16	14	S	73 46
Little-Dog <i>Procyon</i>	7	22	6	3	N	83 57
Hydra's Heart	9	11	7	15	S	82 45
Breast of <i>Cassiopea</i>	0	22	54	45	N	35 6
Girdle of <i>Andromeda</i>	0	51	33	55	N	56 25
Whale's Belly	1	35	1	54	S	78 6
Hydra's Head	8	21	4	30	N	85 30
Pegasus's Mouth	21	28	8	24	N	81 36
Pegasus's Shoulder	23	59	13	22	N	76 38
Head of <i>Andromeda</i>	23	39	27	18	N	62 42
Perseus's Right-side	0	57	48	36	N	41 24
In the Whale's Chap	2	45	2	48	N	87 12
Whale's Tail	0	27	29	48	S	70 12
Orion's Left-thou'der	5	4	6	1	N	83 59
The fore-foot of Great-dog	6	8	17	49	S	72 15
Pole-Star	0	31	87	33	N	2 27
The uppermost in the (square of the Little-bear	14	39	75	36	N	14 24
Left in Great-bear's Tail	62	39	75	47	N	14 13
Bright-Star of the Crown	95	20	27	51	N	62 9

<i>Hercules's Left-knee</i>	17	44	37	21	N	52	59
<i>Swan's Tail</i>	20	28	44	5	N	45	55
<i>Serpentinus's Head</i>	17	20	12	52	N	77	8
<i>Bright Foot of the Twins</i>	6	18	16	38	N	73	22
<i>Lion's Neck</i>	10	1	21	29	N	68	31
<i>South Ballance</i>	14	32	14	37	S	55	23
<i>North Ballance</i>	15	0	8	7	S	81	53

The Use of the preceding Tables.

Of the Table of Meridional Parts.

THis Table contains three Columns; in the first are the Degrees of Latitude; in the second are the Minutes appertaining to those Degrees; in the third are the Meridional Parts answering to those Degrees and Minutes, shewing the Meridian, Difference of Latitude to every 10 min. from the Equinoctial to 80 deg. according to Mr. Wright's Projection.

Example.

Suppose the Latitude be 50 d. 20 m. the Meridional Parts answering thereto, are 2571.

Note; To find the Meridional Parts between any two Latitudes; seek in the Table the Meridional Parts for those two Latitudes, and if the Latitudes be both North, or both South, the Difference; but if the one be North, and the other South, the Sum of the Meridional Parts is the Difference of Latitude in Meridional Parts.

Of the Table of Latitude and Departure

This Table contains 7 Columns; in the first and seventh, are the Points and quarter Points of the Compass, as (in the 1) $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$ 1 Point, &c. (in the 7) 8 Points, $7\frac{1}{4}$, $7\frac{1}{2}$, $7\frac{3}{4}$. In the second Column under (D) stands 1, 2, 3; &c. to 10, which is the Distance sailed. In the 3, 4, 5, and 6 Columns, which are distinguished with (Dep. and (Lat.) is the Difference of Latitude and Departure.

The Use of the Table is to find the Difference of Latitude and Departure, the Course and Distance being given.

Example 1.

Suppose a Ship set sail N. N. E. 9 Leagues; to find the Difference of Latitude and Departure.

The Course is 2 Points, and in the Table under 2 Points, and right against 9 Leagues, the Distance stands |3|444| under (Dep.) and |8|314| under (Lat.) which shews the Departure to be 3 Leagues $\frac{3}{10}\frac{4}{10}\frac{4}{10}$, or 3 Leagues $\frac{4}{10}$, and the the Difference of Latitude 8 Leagues $\frac{3}{10}\frac{4}{10}\frac{4}{10}$, or 8 Leagues $\frac{3}{10}$.

Example 2.

Suppose a Ship sail W. N. W, $\frac{1}{4}$ W. 8 Leagues, to find the Difference of Latitude and Departure.

The Course is 6 Points $\frac{1}{4}$ then over the 6 Points, and against 8 Leag. the Dist. stands |2|695| over (Lat.) and |7|532| over Dep. which shews the Diff. Latitude to be 2 Leag. $\frac{6}{10}$ and the Departure 7 Leag. $\frac{5}{10}$. If the Distance sail'd exceed 10 Leag. then call (2) in the Table under (D) 10; 2, 20; 3, 30 &c. and

and so increate the value of the Figures in the adjacent Columns, under (Dep. and Lat.) accordingly.

Example.

A Ship sails S. E. by E. $\frac{3}{4}$ 67 Leagues, to find the Difference of Latitude and Departure.

Under 3 Points $\frac{3}{4}$, and against 6, (which now stands for 60) stands |4|029| under (Dep) and |4|445| under (Lat.) that is, the Departure is 40 Leag. $\frac{1}{5}$, and the Diff. Lat. 44 Leag. $\frac{4}{5}$: Then for 7 Leag, distance, the Dep. is 4 Leagues $\frac{1}{5}$, and the Diff. Lat. 5 Leag. $\frac{1}{5}$ so 40 Leag. $\frac{1}{5}$ and 4 Leag. $\frac{1}{5}$, being added together, make the Departure required to be 44 Leag. $\frac{1}{5}$, and the Diff. Latitude required to be 49 Leag. $\frac{1}{5}$.

Of the second Table of Rhombs.

This Table by the Course, and both Latitudes, finds the Difference of Longitude.

The first Column on each Page contains the Degrees and Minutes of Latitude, the other Columns shew the Latitudes by which the Rhomb passes, distinguished by (first) (second) (third) (fourth) (fifth) (sixth) and) and seventh) Rhomb, or Points of the Compaſs.

Example.

A Ship sails S. S. W. from the Latitude 42 deg. 20 min. Lat. 45 d. 50 min. to find the Difference of Longitude the Ship has made.

Against the Lat. 42 deg. 20 min. and under the second Rhomb you will find the Longitude to be 10 deg. 13 min. and against the Lat 45 deg. 53 min. and under the second Rhomb you will find 21 deg. 24 m.
Then

then from 21 deg. 24 min. subtract 19 deg. 13 min.
the Remainder 2 deg. 11 min. is the Difference of
Longitude required.

Of the Table of the Sun's Declination.

This table shews the Sun's Declination every Day
of the Year, for several Years to come.

Example 1. To find the Sun's Declination *August* the 15th, 1667.

Turn over the Table till you find the Year 1697,
which you will find to be the first after Leap-Year,
then against the fifteenth Day, under the Month of
August, you will find the Sun's Declination to be 10
deg. 35 min. North.

Example 2. To find the Sun's Declination *January* 26, 1699.

You will find the Year 1699 to be the third after
Leap-Year, and against the 26th Day, and under *January*,
you will find the Sun's Declination to be 15
deg. 49 min. South.

The Use of the Tables of the Sun and Stars Right Ascension is shewn in Page 22.

A Table of Amplitudes for these Degrees of Latitude

61

Sun's Declination	5		10		15		20		22		24		26	
	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	0	1	1	1	2	1	4	1	5	1	6	1	7
2	2	0	2	2	2	4	2	8	2	9	2	12	2	13
3	3	0	3	3	3	6	3	12	3	14	3	17	3	20
4	4	1	4	4	4	8	4	16	4	19	4	23	4	27
5	5	1	5	5	5	10	5	20	5	22	5	28	5	34
6	6	1	6	6	6	13	6	23	6	28	6	37	6	41
7	7	1	7	7	7	15	7	27	7	33	7	40	7	47
8	8	1	8	8	8	17	8	31	8	38	8	46	8	54
9	9	2	9	9	9	19	9	35	9	43	9	51	10	1
10	10	2	10	10	10	21	10	39	10	48	10	57	11	8
11	11	3	11	11	11	23	11	43	11	52	12	3	12	15
12	12	3	12	12	12	25	12	47	12	56	13	9	13	23
13	13	3	13	13	13	27	13	51	14	5	14	15	14	30
14	14	3	14	14	14	30	14	55	15	8	15	27	15	37
15	15	3	15	15	15	32	16	0	16	15	16	2	16	44
16	16	4	16	16	16	35	17	4	17	18	17	34	17	52
17	17	4	17	17	17	37	18	8	18	23	18	4	19	0
18	18	4	18	18	18	39	19	12	19	28	19	46	20	8
19	19	4	19	19	19	41	20	16	20	35	20	54	21	12
20	20	5	20	20	20	44	21	20	21	39	21	59	22	22
21	21	5	21	21	21	46	22	24	22	44	23	8	23	30
22	22	5	22	22	22	49	23	29	23	50	24	12	24	38
23	23	5	23	23	23	41	24	34	24	55	25	19	25	46
24	24	7	24	24	24	44	25	38	25	29	25	34	26	52

The Amplitude is the Distance of rising or setting of the Sun or Stars from the true East or West Points upon the Horizon.

As

A Table of Amplitudes for these Degrees of Latitudes

Decl. Sun's	28		30		32		34		36		38		40	
	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	8	1	9	1	10	1	12	1	14	1	16	1	18
2	2	16	2	10	2	21	2	25	2	19	2	32	2	36
3	3	24	3	28	3	33	3	38	3	44	3	59	3	55
4	4	32	4	37	4	44	4	50	4	58	5	2	4	12
5	5	40	5	46	5	54	6	2	6	11	6	21	6	32
6	6	48	6	56	7	5	7	14	7	25	7	37	7	50
7	8	56	8	6	8	16	8	27	8	40	8	54	8	9
8	9	4	9	15	9	27	9	39	9	54	10	10	10	28
9	10	12	10	24	10	39	10	52	10	0	12	27	12	47
10	11	21	11	34	11	42	12	5	12	24	12	43	13	6
11	12	29	12	44	13	8	13	18	13	39	14	0	14	25
12	13	37	13	53	14	11	14	32	14	54	15	18	15	44
13	14	45	15	23	15	23	15	48	15	9	16	35	17	4
14	15	54	16	12	16	35	16	59	16	24	17	5	18	24
15	17	3	17	46	17	46	18	12	18	40	19	10	19	45
16	18	12	18	32	18	58	19	26	19	45	20	23	21	5
17	19	21	20	43	20	10	20	39	21	11	21	47	22	26
18	20	31	21	54	21	22	21	53	22	27	23	5	23	47
19	21	20	23	5	23	25	23	7	23	44	24	24	25	9
20	22	40	23	16	23	47	24	22	25	0	25	43	26	31
21	23	57	24	26	25	0	25	37	26	17	27	3	27	53
22	25	6	25	38	26	13	26	52	27	35	28	23	29	10
23	26	15	26	49	27	26	28	7	28	53	29	44	30	41
23, 31	26	52	27	25	28	30	28	45	29	22	30	25	31	22

As in the Table, in the Latitude of 50 deg. the Sun or Star having 15 deg. North Declination, they will rise 31 deg. 10 min. to the Northward

A Table of Amplitudes for these Degrees of Latitude.

Sun's Decl.	42				44				45				46				47				48				49			
	D. M.		D. M.		D. M.		D. M.		D. M.		D. M.		D. M.		D. M.		D. M.		D. M.		D. M.		D. M.		D. M.		D. M.	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	21	1	21	1	25	1	26	1	28	1	29	1	29	1	29	1	29	1	29	1	29	1	29	1	29	1	41
2	2	41	2	41	2	50	2	53	2	56	2	59	2	59	2	59	2	59	2	59	2	59	2	59	2	59	2	3
3	4	2	4	2	4	15	4	16	4	24	4	29	4	29	4	29	4	29	4	29	4	29	4	29	4	29	4	34
4	5	23	5	28	5	40	5	46	5	52	5	59	5	59	5	59	5	59	5	59	5	59	5	59	5	59	5	6
5	6	49	6	58	7	5	7	12	7	21	7	29	7	29	7	29	7	29	7	29	7	29	7	29	7	29	7	38
6	8	5	8	21	8	30	8	38	8	49	8	59	8	59	8	59	8	59	8	59	8	59	8	59	8	59	8	10
7	9	26	9	45	9	56	10	6	10	18	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10	30	10	42
8	10	47	11	9	11	21	11	33	11	47	11	59	11	59	11	59	11	59	11	59	11	59	11	59	11	59	11	14
9	12	9	12	34	12	47	13	1	13	16	13	31	13	31	13	31	13	31	13	31	13	31	13	31	13	31	13	48
10	13	31	13	58	14	12	14	27	14	43	15	2	15	21	15	21	15	21	15	21	15	21	15	21	15	21	15	21
11	14	53	15	23	15	39	15	55	16	15	16	34	16	34	16	34	16	34	16	34	16	34	16	34	16	34	16	54
12	16	16	16	48	17	6	17	25	17	45	18	6	18	28	18	28	18	28	18	28	18	28	18	28	18	28	18	28
13	17	38	17	13	18	33	18	54	19	16	19	29	19	29	19	29	19	29	19	29	19	29	19	29	19	29	19	3
14	19	0	19	39	20	0	20	23	20	47	21	12	21	12	21	12	21	12	21	21	12	21	12	21	21	12	21	38
15	20	23	21	5	21	28	21	53	22	18	22	45	23	14	23	14	23	14	23	14	23	14	23	14	23	14	23	14
16	21	46	22	32	22	56	22	23	23	50	24	20	24	51	25	26	25	26	25	26	25	26	25	26	25	26	25	28
17	23	10	23	59	24	25	24	53	25	23	25	55	26	28	26	28	26	28	26	28	26	28	26	28	26	28	26	6
18	24	34	25	27	26	55	25	25	25	57	27	31	28	32	29	7	29	45	29	45	29	45	29	45	29	45	29	45
19	25	59	26	54	27	2	27	57	28	32	29	7	29	45	29	45	29	45	29	45	29	45	29	45	29	45	29	45
20	27	24	28	23	28	56	29	30	30	5	30	45	31	25	31	25	31	25	31	25	31	25	31	25	31	25	31	25
21	28	56	30	53	30	27	31	33	31	4	32	23	33	6	32	23	33	6	32	23	33	6	32	23	33	6	32	6
22	30	13	31	23	32	0	32	37	33	19	34	3	34	48	35	43	35	43	35	43	35	43	35	43	35	43	35	48
23	31	46	32	55	33	32	34	13	34	4	35	36	34	26	36	34	36	26	36	34	36	26	36	34	36	26	36	34
24	32	27	33	41	34	20	35	2	35	15	36	34	36	26	36	34	36	26	36	34	36	26	36	34	36	26	36	26

ward of the East, and let 31 deg. 10 min. to the Northward of the West: But if the Declination had been 15 deg. South, then they would have risen

A Table of Amplitudes for these Degrees of Latitude.

Sun's Decl.	50		51		52		53		54		55		56	
	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.	D.	M.
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	33	1	35	1	37	1	39	1	41	1	42	1	47
2	3	5	3	10	3	15	3	20	3	24	3	29	3	34
3	4	40	4	46	4	52	4	59	5	6	5	14	5	22
4	6	14	6	22	6	30	6	38	6	49	6	59	7	10
5	7	40	7	58	8	8	8	19	8	30	8	45	8	50
6	9	22	9	34	9	46	10	0	10	15	10	30	10	47
7	10	56	11	40	11	25	11	41	11	58	12	16	12	35
8	12	31	12	47	13	4	13	22	13	41	14	2	14	24
9	14	5	14	24	14	43	15	4	15	26	16	48	16	15
10	15	40	16	1	16	23	16	46	17	11	17	37	18	6
11	17	16	17	39	18	3	18	29	18	57	19	20	19	57
12	18	52	19	18	19	44	20	13	20	43	21	15	21	50
13	20	29	20	58	21	26	21	57	22	30	23	5	23	43
14	22	6	22	38	23	8	23	42	24	18	24	57	25	38
15	23	44	24	17	24	51	25	28	26	7	26	49	27	34
16	25	23	25	59	26	36	27	16	27	58	28	43	29	52
17	27	3	27	41	28	21	29	4	29	50	30	39	31	31
18	28	44	29	25	30	8	30	54	31	44	32	36	33	33
19	30	26	31	9	31	56	32	45	33	38	34	35	35	36
20	32	9	32	55	33	46	34	39	35	35	36	36	37	42
21	33	53	34	48	35	36	36	33	37	33	38	40	39	51
22	35	40	36	32	37	29	38	31	39	37	40	46	42	4
23	37	26	38	23	39	24	40	29	41	40	42	56	44	20
24	38	20	39	20	40	21	41	29	43	42	44	2	45	30

31 deg. 10 min. to the Southward of the East, and
 let 31 deg. 10 min. to the Southward of the West.
 Look for your Latitude in the head of the Ta-
 ble,

A Table for Amplitudes for these Degrees of Latitude.

Sun's Decli.	57		58		59		60	
	D.	M.	D.	M.	D.	M.	D.	M.
0	0	0	0	0	0	0	0	0
1	1	50	1	35	1	56	2	0
2	3	40	3	46	3	53	4	0
3	5	31	5	40	5	50	6	0
4	7	22	7	34	7	47	8	1
5	9	14	9	28	9	45	10	2
6	11	4	11	13	11	43	12	4
7	12	56	13	18	13	41	14	6
8	14	48	15	14	15	41	16	10
9	16	42	17	10	17	41	18	14
10	18	36	19	8	19	42	20	19
11	20	31	21	6	21	45	22	26
12	22	26	23	6	23	49	24	34
13	24	23	25	7	25	59	26	44
14	26	21	27	10	28	1	28	56
15	28	22	29	14	30	10	31	10
16	30	24	31	21	32	22	33	27
17	32	28	33	29	34	35	35	47
18	34	34	35	40	36	52	38	10
19	36	43	37	54	39	13	40	37
20	38	53	40	12	41	37	43	10
21	41	9	42	34	44	40	45	47
22	43	27	42	59	46	40	48	32
23	45	50	47	30	49	21	51	24
23, 31	47	2	48	49	50	44	52	53

ble, and the Declination in the first Column on the Left-hand, and in the common Angle of meeting, you will find the Amplitude desired.

In the Latitude of 30 deg. the Sun's Declination being 7 deg. 0 m. North; I demand the Amplitude.

Answ. The Amplitude is 8 deg. 6 min. from the East Northward, at Sun-rising, or from the West Northward; at Sun-setting: But if the Declination had been 7 deg. 0 min. South, in Latitude 30 deg. as above laid, then

the Amplitude would have been 8 deg. 6 min. from the East Southward, at Sun-rising, and 8 deg. 6 min. from the West Southward, at Sun-setting;

ting; for if the Declination be North, the true Amplitude will always be to the Northwards of the East or West: But if the Declination be South, the true Amplitude will always be to the Southwards of the East or West.

If you have any odd Minutes of Declination, you must take the proportional Part.

In the Latitude of 42 deg. 30 min. the Sun's Declination being 12 deg. 15 min. I demand the Amplitude.

Answer, The Amplitude is 16 deg. 43 min.

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By John Colson

*To know the Hour and Minute of the Sun-
Rising and Setting at any time of the Year,
in any Place of the habitable World.*

By HENRY PHILIPS.

THE time of the Sun-Rising and Setting is exactly set down in the fifth Column of the *Sea-man's Kalendar*, for every Day of the Year for the Latitude of *London*, so that by knowing the Day of the Month, you may know the time of Sun-Rising and Setting without farther trouble. Now if you double the time of Sun-rising, you may know the Length of the Night: Likewise double the time of the Sun-letting, and it shews the Length of the Day. This is so plain that it needs no Example.

But because the Sun-Rising and Setting doth differ in every Latitude; therefore for the Use of Sea-men, I have set down this Table, by which, knowing the Place of the Sun, and the Latitude of the Place you are in, you may know the time of Sun-Rising and Setting in any Place of the habitable World.

Because the Day of the Month is more readily known to some, than the Sign which the Sun is in, therefore I have on the side of the Table set down the Days of the Months, the Use whereof is the same with the other. For if you find the Day of the Month on the

Here enter *A Table of the Sun's rising and setting in all Places*
 with the Day *to the Latitude of 60 Degrees.*
 of the Month *The Latitude or Height of the Pole,*
 to find the

		5	10	15	20	25	30	35	40
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
December	11	5 51	5 42	5 33	5 24	5 13	5 2	4 49	4 34
	17	5 51	5 42	5 33	5 24	5 13	5 3	4 50	4 35
	23	5 52	5 43	5 33	5 25	5 14	5 4	4 51	4 36
	28	5 52	5 43	5 34	5 25	5 16	5 6	4 53	4 40
	3	5 53	5 44	5 35	5 25	5 18	5 8	4 56	4 44
January	9	5 53	5 45	5 37	5 29	5 21	5 11	5 0	4 48
	15	5 54	5 46	5 39	5 31	5 23	5 15	5 4	4 54
	21	5 54	5 48	5 41	5 33	5 36	5 19	5 10	5 8
	27	5 55	5 50	5 43	5 36	5 30	5 23	5 15	5 6
	3	5 56	5 50	5 45	5 39	5 34	5 28	5 22	5 13
February	10	5 56	5 56	5 47	5 43	5 38	5 33	5 28	5 21
	14	5 57	5 57	5 49	5 45	5 42	5 38	5 34	5 28
	20	5 58	5 58	5 52	5 49	5 47	5 44	5 41	5 36
	26	5 58	5 58	5 55	5 52	5 51	5 49	5 47	5 44
	4	5 59	5 59	5 57	5 56	5 55	5 54	5 53	5 52
March	10	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0
	16	6 1	6 3	6 4	6 6	6 5	6 1	6 7	6 8
	22	6 2	6 3	6 5	6 7	6 9	6 11	6 13	6 16
	28	6 2	6 5	6 8	6 11	6 13	6 16	6 19	6 24
	3	6 3	6 7	6 11	6 15	6 18	6 22	6 21	6 32
April	9	6 4	6 8	6 13	6 17	6 22	6 27	6 32	6 39
	15	6 4	6 10	6 15	6 11	6 36	6 31	6 39	6 47
	22	6 5	6 11	6 17	6 14	6 30	6 37	6 45	6 54
	28	6 6	6 12	6 19	6 17	6 44	6 41	6 50	7 0
	5	6 6	6 14	6 21	6 29	6 47	6 45	6 56	7 6
May	10	6 7	6 15	6 23	6 31	6 39	6 49	7 0	7 12
	17	6 7	6 16	6 25	6 33	6 42	6 52	7 4	7 17
	23	6 8	6 17	6 26	6 35	6 44	6 54	7 7	7 21
	29	6 8	6 17	6 27	6 35	6 46	6 56	7 9	7 24
	4	6 9	6 18	6 27	6 36	6 47	6 57	7 10	7 25
June	11	6 9	6 18	6 27	6 36	6 47	6 58	7 11	7 26
	18	6 9	6 18	6 27	6 36	6 47	6 58	7 11	7 26
Sun's rising.		5	10	15	20	25	30	35	40

*A Table of the Sun's rising and setting in all Places
to the Latitude of 60 Degrees.
The Latitude or Height of the Pole.*

Here enter
with the Day
of the Month
to find the
Sun's rising.

44	47	50	52	54	56	58	60		
h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.		
4 21	4 9	3 5	3 45	3 33	3 20	3 4	2 44	11	11
4 21	4 10	3 56	3 46	3 34	3 21	3 5	2 46	0	17
4 23	4 12	3 59	3 49	3 37	3 24	3 9	2 51	29	23
4 27	4 16	4 3	3 53	3 43	3 30	3 16	2 59	22	30
4 31	4 21	4 9	4 0	3 50	3 31	3 25	3 9	17	8
4 37	4 27	4 16	4 8	3 58	3 48	3 36	3 22	10	12
4 43	4 34	4 24	4 19	4 8	3 59	3 48	3 35	4	19
4 50	4 42	4 33	4 26	4 19	4 11	4 13	3 57	28	25
4 58	4 54	4 43	4 37	4 30	4 23	4 15	4 5	22	31
5 6	5 0	4 53	4 48	4 43	4 30	4 25	4 21	15	6
5 13	5 10	5 4	5 0	5 55	4 50	4 44	4 37	9	13
5 21	5 19	5 15	5 11	5 35	4 44	4 59	4 54	3	19
5 33	5 29	5 26	5 23	5 21	5 18	5 14	5 16	28	15
5 42	5 40	5 37	5 39	5 34	5 33	5 29	5 27	22	31
5 51	5 50	5 49	5 48	5 47	5 46	5 49	5 43	26	6
6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	10	12
6 9	6 10	6 11	6 12	6 13	6 14	6 15	6 17	4	18
6 13	6 20	6 23	6 24	6 26	6 28	6 31	6 33	26	25
6 20	6 34	6 31	6 37	6 39	6 42	6 46	6 50	20	30
6 36	6 41	6 41	6 49	6 52	6 56	7 1	7 6	14	27
6 45	6 50	6 56	7 0	7 5	7 10	7 16	7 23	8	13
6 54	7 0	7 7	7 12	7 17	7 24	7 31	7 39	2	19
7 10	7 9	7 17	7 23	7 30	7 37	7 45	7 55	27	15
7 10	7 14	7 27	7 34	7 41	7 49	7 59	8 10	21	31
7 17	7 26	7 36	7 41	7 53	8 18	8 12	8 25	15	6
7 23	7 33	7 41	7 52	8 28	8 12	8 24	8 38	9	11
7 29	7 39	7 51	8 0	8 10	8 22	8 35	8 51	3	17
7 33	7 44	7 57	8 7	8 17	8 30	8 44	9 1	28	29
7 37	7 48	8 18	8 11	8 23	8 36	8 51	9 0	23	23
7 39	7 50	8 48	8 14	8 26	8 39	8 55	9 14	17	5
7 39	7 51	8 58	8 15	8 27	8 40	8 56	9 16	11	11
44	47	50	52	54	56	58	60	Sun's setting.	

The South Latitude.

Table, and the Latitude you are at in the head of the Table, in the square-meeting of these two, you shall find the Sun-Rising or Setting, as before.

For Example.

The 21st of *January* in the Latit. of 49. deg. the Sun sets at 5 h. 0 m the Difference of Time is 6 m. and the Difference of the Days are 6; that is, 1 m. for every Day. So that if you would know the time of Sun-set on the 24th Day, it will be 5 h. 3 m.

Again, if you would know the time of Sun-set on the 24th of *January*, in the Latitude of 42 deg. Here is neither the Day of the Month, nor the Latitude to be found exactly; but you find that the 21st of *Jan.* in the Latitude of 40, the Sun sets at 5 h. 0. min. And the 27th of *Jan.* in the Latitude of 44, the Sun sets at 4 h. 58 min. Now because the Latitude of 42 is the middle between 40 and 44, and likewise the 24th Day, the midst between the 21st and 27th Days; take the middle between the two times set down in the Table, which is 9 h. 56 m. which is the time of Sun-set on that Day, in the Latitude desired.

F I N I S.

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